FIRST LEVEL SCREENING – *WEEG 2015*

APPLICANT NAME: Three Sisters I.D.	CONTROL NUMBER: 76
APPLICANT LOCATION: Sisters, OR	TASK AREA: A, BCD
PROJECT NAME: Main Canal Pipeline Project Phases VII-IX & TSID Net Meter/ Micro Hydro	BOR $: 1,000,000 Cost Share $: 3,737,906

	SCREENING FACTOR	COMPLETE	COMMENTS
1	Eligibility requirements		
	• Eligible applicant in a Reclamation state	✓YES __NO	
	• 50% or more non-Federal cost share	✓YES __NO	
	• Authorized funding amount ($1 Million total – no more than $500,000 a year)	✓YES __NO	
	• Funding Group I or II	__I ✓II	
	• Length of project (9/30/17 – FG I or 9/30/18 – FG II)	✓YES __NO	9/30/18
2	Proper format and length (75 pages)	✓YES __NO	
3	Proposal content		
	• SF-424 (authorized signature)	✓YES __NO	
	• SF-424B or SF-424D (authorized signature)	✓YES __NO	
	• Title page	✓YES __NO	
	• Table of contents	✓YES __NO	
	TECHNICAL PROPOSAL/EVALUATION CRITERIA (No More Than 50 Pages)		
	• Executive summary	✓YES __NO	
	• Background data	✓YES __NO	
	• Technical Project description	✓YES __NO	
	• Evaluation Criteria	✓YES __NO	
	• Project Benefits/Performance Measures	✓YES __NO	
	• Potential Environmental Impact Desc.	✓YES __NO	
	• Required Permits/Approvals, if applicable	__YES ✓NO	will need, but not addressed
	• Letters of Project Support	✓YES __NO	
	• Official Resolution (Required 30 Days After)	✓YES __NO	
	PROJECT BUDGET		
	• Funding Plan	✓YES __NO	
	• Letters of Funding Commitment	✓YES __NO	Some
	• Budget Proposal	✓YES __NO	
	• Budget Narrative	✓YES __NO	
	• SF-424A or SF-424C	✓YES __NO	

1st Level Screening Comments (Screening Committee Member):

Summary Comments (Grants Officer):

Applicant is eligible for consideration during the Second Level Evaluation phase ✓ **Yes** ____ **No**

Grants Officer **Date** 1/26/15

Copy

Three Sisters Irrigation District
Watson-McKenzie Main Canal Pipeline
Project Phases VII-IX
And
TSID Net Meter/Micro Hydro Generation Project

DESCHUTES COUNTY
OREGON

THREE SISTERS IRRIGATION DISTRICT
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Office 541-549-8815
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Project Manager: Marc Thalacker

January 23, 2015

TABLE OF CONTENTS

Technical Proposal: Executive Summary

January 23, 2015

Three Sisters Irrigation District
Sisters, Deschutes County, Oregon

The project includes components that accomplish goals set out in Tasks A, B, C, and D. TSID is asking the Bureau of Reclamation for $1,000,000 spread over 3 years to complete the final 3 phases of this project (one phase per year).

Task A: Water Conservation: The project includes the replacement of an existing canal (identified as the Three Sisters Irrigation District Main Canal between Watson and McKenzie Reservoirs) with two side-by-side buried pipelines. It provides irrigation water for approximately 99 rural landowners across approximately 2500 acres. The project will pipe in three phases 14,000 feet of open canal with one 42" high density polyethylene (HDPE) pipe gravity fed from Highway 126 and one 36", 32", 28", 26", 22" and 12" HDPE pipe (graduating down in size as flows decrease) delivering pressurized water to the farms in the Upper District. The on farm component of this project hopefully will be funded through the NRCS RCPP program and when complete will encompass over 65 on-farm projects in the Upper District. Phases 7-9 of the Watson-McKenzie Main Canal Pipeline project will conserve between 1900acre feet in canal seepage loss annually.

Task B: Energy –Water Nexus: With the completion of the last three phases of this project, pressurized water will eliminate electrical pumps on farm that are using over 3 million kWh of electricity annually. The potential funding from the NRCS RCPP Program allows the farms in the Upper District to pipe their private laterals which allows them to access the pressurized water from the pressurized pipeline. These on farm projects are identified in TSID's piping and conserved water assessment in its Agricultural Water Management and Conservation Plan (AWM&CP) which was created with assistance from BOR System Optimization Review grant. Once the remaining 3 phases (14,000 feet) are piped, the 42" gravity fed pipe will create the opportunity for the installation of a .3MW Francis turbine at McKenzie Reservoir which will generate one million kWh annually. In addition TSID is partnering with NRCS (design), Bonneville Environmental Foundation (BEF) and BPA(funding) and Oregon Department of Energy to install a 25 kW net meter turbine/generator and 3 micro-hydro turbine/generator units (two 50kW & 75kW) on the pressure pipe that delivers pressurized water to TSID's farmers. Annual generation for the 4 turbines will be 400,000 – 600,000 kWh.

Task C: Benefits to Endangered Species: As each phase of the Main Canal Pipeline is completed it puts 1 cfs of water in Whychus Creek. Phases 7-9 of the project will dedicate an additional flow of 3 cfs which will bring the total in-stream protected flow in Whychus Creek to over 33 cfs, significantly surpassing Oregon Department of Fish & Wildlife (ODFW) minimum in-stream flow target of 20 cfs and achieving the target flow for the lower reaches of 33 cfs. This conserved water will benefit summer steelhead (Mid-Columbia ESU) in the Deschutes Basin which are listed as threatened under the Endangered Species Act. Bull trout which are also listed as threatened occur within the lower 1-2 miles of Whychus Creek which is part of the project area. The bull trout within the project area are within the Lower Deschutes River subpopulation. Lower Whychus Creek has been designated critical

habitat for bull trout. Bull trout use in Whychus Creek is mainly sub adult rearing, and potentially spawning (USFWS 1998). Whychus Creek currently supports native redband trout, mountain whitefish, dace, bridgelip suckers, chiselmouth, northern squawfish and sculpins. Although these resident species play important roles in Whychus Creek, restoration partners and restoration funders have coalesced around anadromous reintroduction of Steelhead and Salmon to Whychus Creek while simultaneously improving conditions for native resident trout. USFS considers redband trout a sensitive species. Steelhead, Chinook and Sockeye could be brought above the Round Butte-Pelton complex as early as 2015. These additional flows in Whychus Creek will help make the anadromous reintroduction as success. Currently the DBBC (The 7 Central Oregon Irrigation Districts) is working on a Habitat Conservation Plan with USFW, NMFS, BOR and all the Deschutes Basin Stakeholders. The HCP will focus on Steelhead, Bull Trout, Chinook & Sockeye Salmon, Oregon Spotted Frogs, willow flycatcher and yellow breasted chat.

Task D Water Marketing: TSID is working with DRC to market and certificate the 3 cfs from these 3 phases of the 9-phase project (approximately 1400 acre feet annually) into a water right held by the State of Oregon that will protect flows for fish and water quality in Whychus Creek.

The Watson-McKenzie Main Canal Pipeline Project Phases 7-9 will be completed as follows:
Phase 7 Oct. 2015- Sept. 2016, Phase 8 Oct. 2016- Sept. 2017 and
Phase 9 Oct. 2017- Sept. 2018.
The project is not located on a Federal Facility.

Background Data

Provide a map of the area showing the geographic location (include the State, county, and direction from nearest town).

As applicable, describe the source of water supply, the water rights involved, current water uses (i.e., agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demand. Also, identify potential shortfalls in water supply. If water is primarily used for irrigation, describe major crops and total acres served.

In addition, describe the applicant's water delivery system as appropriate. For agricultural systems, please include the miles of canals, miles of laterals, and existing irrigation improvements (i.e., type, miles, and acres). For municipal systems, please include the number of connections and/or number of water users served and any other relevant information describing the system.

If the application includes renewable energy or energy efficiency elements, describe existing energy sources and current energy uses.

See attached map in Appendix A

The Three Sisters Irrigation District was founded in 1917 from the Squaw Creek Irrigation Company and the Cloverdale Irrigation Company, which were founded in 1891 and 1903 respectively, making Three Sisters Irrigation District one of the oldest such districts in Oregon.

The Three Sisters Irrigation District is a quasi-governmental corporation, a political subdivision of the State of Oregon, duly organized and operated under Oregon law governing irrigation and other special districts. Special districts are governed by a variety of Oregon statutes and administrative rules; more specifically, Chapter 545 of the Oregon Revised statutes addresses the operation of irrigation districts.

TSID water comes from Whychus Creek fed by the Three Sisters in the Oregon Cascade Mountains. The District depends solely on live stream flow. Climate change is definitely a major concern and diminishing future snow pack could pose a real threat. Piping the whole district is the most effective way to shore up supplies for famers and fish.

Historically TSID diverts between 30,000 to 35,000 acre feet. 20,000 – 22,000 in drought years like 1977, 2001 & 2005. The Oregon Water Resources Department maintains a gauging station near TSID's diversion on TSID's main canal. The recorder takes a reading every 15 minutes. Diversion records date back to 1960. Conversion from flood irrigation to sprinkler occurred in the late 1960's into 1970's. Those conservation measures reduced TSID diversion from 50,000 acre feet to 35,000 acre feet. Climate change and drought can create short falls in supply which are then made up for with deep turbine supplemental wells both at the District and on farm.

Three Sisters Irrigation District is generally described as running in a northeasterly direction from Whychus Creek (a tributary of the Deschutes River), through the Cloverdale area, and down McKenzie Canyon to the Lower Bridge area. The office is located 4 miles southeast of the city of Sisters on Highway 20. TSID serves farm land in both Deschutes County and Jefferson County, 20 miles west of Redmond in the Upper Deschutes River Basin.

The source of water comes from Whychus Creek a tributary of the Deschutes River. TSID holds the water right certificates on 7572 acres of water rights. The Main Canal Pipeline Project serves 7572 acres and 180 farmers that use the water for agricultural applications. Due to the nature of the climate in Central Oregon we are continuously looking for ways to stretch the water that is available. Piping will not only conserve a considerable amount for fish reintroduction, but also serve the farmers by giving them more water.

If water is primarily used for irrigation, describe major crops, total acres served:

On 53% of the cropland, alfalfa or grass hay is grown. 25% is pasture and 22% is used to produce specialty crops such as carrot seed, grass seed, radish seed, sugar beet seed and grains. The total irrigated acreage served in the project area is 7572 acres.

Prior to 2010 the majority of 180 TSID water users had electric surface pumps that pump from delivery ponds or directly from the canals. Flood irrigation only occurs on 5-6 properties in the District irrigating less than 400 acres by flood application. In May of 2010, the McKenzie Pipeline project went live and started delivering pressurized water to 2000 acres in Lower Bridge eliminating 38 pumps conserving almost 3,000,000 kWh annually. After McKenzie, between 2010-2014, TSID completed additional projects which included the Main Canal phases 1-3, Uncle John lateral, and Watson McKenzie Main Canal phase 4 and 5 pressurized the Fryrear, Patterson and Halousek/Vermilyea, Lazy Z, Cyrus, Arnold, B-Ditch and Tumalo EQIP projects (2700 acres). In 2014 TSID built a 746kW hydro facility. This plant will produce 3,100,000 kWh per year, enough green power to serve 300 homes during the irrigation season, March-October.

In turn, when the McKenzie Hydro plant is built in 2018 and goes on line in 2019, TSID will produce approximately 1,000,000 additional kWh, enough green power to serve 100 homes during the irrigation season, March-October.

The system consists of approximately 31.5 miles of District owned and operated pipelines and canals and 28 miles of privately owned and operated pipelines and ditches. TSID has two principal water regulating facilities—Watson and Mckenzie Reservoirs. Water diverted from Whychus Creek flows through double side by side 54" HDPE Main Canal Pipelines. One pipe flows into TSID's 746kW Hydro facility through the turbine and into Watson Reservoir, from which it runs through the 42" Main Canal Pipeline (phases 4-6) into the Main Canal and the 24" Cloverdale Pipeline into the Cloverdale Canal to the McKenzie Reservoir. The second 54" HDPE Main Canal pipe delivers pressurized water to a series of pipelines—Uncle John, Fryrear, Halousek/Vermilyea. From the McKenzie Reservoir water runs down the Association and Black Butte Pipelines where it serves the needs of McKenzie Canyon and Lower Bridge farmers. Of the 60 miles of canals and ditches, over 45 miles are piped. Over 4500 of the 7572 irrigated acres are served by pipelines.

Pipeline, Canal and Ditch Lengths

Main Canal Pipeline	
from Diversion to Watson Reservoir (Phases 1-3)	Approx. 3.77 miles
Main Canal from Watson to McKenzie Reservoir	
(Phases 4 & 5 piped, Phase 6 under construction)	Approx. 5.3 miles
Cloverdale Pipeline & Canal (3 miles piped)	Approx. 10 miles
Black Butte Canal Pipeline	Approx. 10.5 miles
Association Canal Pipeline	Approx. 2 miles
Private ditches and pipelines	Approx. 28.5 miles

COMPLETED CONSERVATION PROJECTS

Vermilyea: The project involved piping approximately 3000ft of the 7000ft ditch. The project conserves between 50 and 75 acre-feet per irrigation season.

Brown: The Brown project involved the elimination of approximately an 8000ft ditch. The 5 farms that the ditch served were all converted from on farm flood irrigation to pressurized sprinklers. The project conserves over 500-acre feet per irrigation season.

Bartlemay Pipeline: The Bartlemay Pipeline was a model conservation project, 7200 feet of open ditch with a 50% loss factor has been put in pipe and buried. Three of the five ponds have been lined. The project conserves from 300 to 500 acre-feet per season

Thompson: The Thompson project eliminated the Thompson Ditch, which was approximately 7000ft. Subsequently returning 1 cfs of 1885 senior water right and 1 cfs junior 1900 water right to the stretch of Whychus Creek between TSID's diversion and the proposed diversion point on the Deggendorfer property T15-R10-S2 tax lot 100. The project also eliminated existing ditch losses. The project converted the flood irrigation to a sprinkler system, directly resulting in conservation of water applied to existing crops.

Cloverdale: The Cloverdale canal serves 1000 acres of farmland in Three Sisters Irrigation District. Traditionally the transmission loss of the canal has been between 45% and 55%. As a result when running the maximum flow of 20 cfs only, approximately, 10 cfs was being

delivered to the farmers. By piping 14880 feet of the canal TSID will save 4 cfs in transmission losses. TSID dedicated 2 cfs to instream and 2 cfs will be available to all the farmers in the district.

Schaad: This project replaced approximately 8000ft of open ditch with HDPE ADS pipe. The project conserves from 200 to 300 acre feet per season.

B-Ditch: This project replaced approximately 6000 of 7000ft of open ditch with culvert and PVC. This project was unique because 3 of the landowners paid for the whole project without the help of any grant monies. The project conserves from 200 to 300 acre-feet per season.

Fryrear: The project included the replacement of an existing open lateral (identified as the Fryrear Ditch) with a buried pipeline. It provides irrigation water for approximately 475 acres. This project consisted of piping the first 19,000 feet of ditch. This distance included sections traveling through Forest Service lands and very high seepage reaches of canal. Benefits have accrued due to water savings, electrical energy conservation and reduction of operation and management costs. The water savings in this project are of special consideration because the reduction of diversion flows from Whychus Creek has increased in-stream flows on a year round basis. Whychus Creek has traditionally been completely dewatered during the irrigation season and only recently has a year round flow been established. The conservation efforts of the Three Sisters Irrigation District and local conservation organizations are responsible for the augmented flows. The project has returned a flow rate of 1.5 cubic foot per second to Whychus Creek and annually conserves an estimated total of 600 acre-feet of water.

Z-Ditch: This project replaced approximately 6000 ft of open ditch with HDPE. This project was a huge improvement for the 5 landowners. Prior to the piping each landowner received water just 1 day a week. The project conserves from 200 to 300 acre feet per season.

McKenzie Canyon/Black Butte Canal: This project involved the replacement of TSID' s Black Butte and Association canals with a buried pipeline, resulting in the permanent transfer of 6 cfs of water to Whychus Creek.

Arnold Ditch: This project has replaced approximately 9240 of open ditch with PVC pipe. This project serves 6 landowners that farm 155 acres. The project will conserve from 300 to 400 acre feet per season.

Vetterlein: This project replaced an open lateral with a buried pipeline. It provides irrigation water for approximately 160 acres. This project consisted of piping 15,000 feet of ditch with HDPE pipe. Benefits have accrued due to water savings, electrical energy conservation and reduction of operation and management costs.

Uncle John Lateral: The project replaced an existing canal (identified as the Uncle John Lateral teeing off TSID Main Canal Pipeline) with a buried pipeline The project piped 20,000 feet of open canal with 24", 18" and 12" high density polyethylene (HDPE) pipes. The Main Canal/Uncle John Lateral/ project will conserve approximately 600-900 acre feet in canal seepage loss annually. It brought pressurized water to 560 acres. Thus eliminating and conserving over 500,000 kWh per year.

Halousek/Vermilyea Pipeline (NRCS AWEP Project): This project combined two open ditches and slip lined an un-pressurized ADS pipeline. In total 14,050 feet of 16", 12", 10",

8" and 6" mainline was installed. The project pressurized 264 acres, resulting in conserving 300-400 acre feet annually and eliminating over 300,000 kWh per year.

Hurtley Pipeline and Variable Drive Pumping station: This pipeline consists of approximately 10,000 of buried PVC and above ground aluminum pipe. The system serves approximately 30 parcels. The system was almost 30 years old. The PVC had deteriorated from freeze cracks, water hammers and glue joints leaking. The aluminum pipe was worn out and leaked. Through a ARRA grant from ODOE and cash from the 30 farmers, TSID was able to replace the 2 worn out 30 horse centrifugal pumps with a 20 hp and 40 hp vertical turbine with variable drives. DRC and the farmers supplied pipeline & installation money to install over 7,000 feet of 10", 8" and 4" HDPE pipe. The farmers dedicated .41cfs (400 acre feet per year) instream.

Desert Sands: These 2 pipelines consist of approximately 5000 to 6000 feet of buried PVC.

Remaining Open ditches to be piped

Cement:	Approximately 6000ft of open concrete ditch.
Hermens:	Approximately 2800ft of open concrete ditch and 1500ft of PVC pipe.
Cloverdale	Approximately 7 miles of open canal.

Identify any past working relationships with Reclamation. This should include the date(s), description of prior relationships with Reclamation, and a description of the projects(s).

- 2012 Watson/McKenzie Main Canal Pipeline Project Phases 4-6 In Concert with TSID/NRCS AWEP on Farm Water and Energy Efficiency WaterSMART Challenge Grant $1,500,000 R12AP13011 Replace 14,000 feet of Main Canal with dual 54" & 48" & 42" HDPE Pipe & Materials. Work with 85 TSID farmers with NRCS AWEP program to install on farm improvements to save water and energy.

- 2011 Uncle John Lateral Canal Piping, Hydropower, and Whychus Waterbank WaterSMART Challenge Grant $852,000 R11AP13035 Install 700kW hydropower generation on the Main Canal penstock; Pipe 20,000 feet of open canal and establish a Whychus Waterbank

- 2010 Phase III Main Canal Water and Energy Efficiency WaterSMART Challenge Grant $1,000,000 R010AP1C066 Replace 5,175 feet of Main Canal with dual 54" HDPE Pipe & Materials (Including fish passage, channel restoration and installation of FCA fishscreen at TSID diversion on Whychus Creek)

- 2009 Phase I Main Canal Water Marketing and Efficiency ARRA Challenge Grant $1,150,000 R09AP1CR06 Purchased 16,500 feet of 54" HDPE Pipe & Material(Including 4 stainless steel headgates along with installing a SCADA and telemetry system

- 2009 Phase I, II & III Main Canal TSID is a sub recipient of BOR ARRA funding awarded R09AP1CR03 to Deschutes River Conservancy $2,300,000 Purchased 17,900 feet of 54" HDPE Pipe & Materials for Phase I, II & III.

- 2008 Water Conservation Field Services Program 1425-08-FG-1L-1354, 10/23/2008. BOR WCFSP grant for $3,100. Purchased a mobile GPS unit with GIS software.

- 2008 System Optimization Review 1425-08-FG-1L-1395, 10/23/2008. The grant is being used to develop an Agricultural Water Management and Conservation Plan (AWM&CP)

- 2008 Phase I of McKenzie Canyon Irrigation Pipeline Project BOR 2025 Challenge grant for $300,000. 1425-08-FG-1L-1397, 9/15/2008.

- 2006 Phase IV of McKenzie Canyon Irrigation Pipeline Project BOR 2025 Challenge grant for $300,000. 1425-06-FC-1L-1250, 9/21/2006.

- 2005 Phase V of McKenzie Canyon Irrigation Pipeline Project BOR 2025 Challenge grant for $300,000. 1425-05-FC-1L-1168, 9/23/2005.

- 2000 and 2002 we had cooperative grant agreements for gauging station in the Watson and McKenzie reservoirs in the Water Conservation Field Services Program.

- The Cloverdale and Fryrear Pipeline Project grants from the DRC (Funded by BOR).

Technical Project Description

Watson-McKenzie Main Canal Pipeline Phases 6-9 will involve piping 14,000 feet of open canal. TSID will construct the pipeline in 3 one year phases. Phase 7 will consist of installing 5000 feet of 42" high density polyethylene (HDPE) pipe (DR 32.5 63 psi rated). This pipe ultimately will serve as a penstock to a 300kW hydro plant that TSID will build after completion of phase 9. This pipe carries the flow from Watson Reservoir to Mckenzie Reservoir which serves 2000 irrigated acres in Lowerbridge. The second pipe consists of 3260 feet of 36" and 1650 feet of 32"HDPE pipe DR 15.5 139 psi.

First TSID will excavate the 5000 feet of canal. Second bed the canal with sand. Third weld up 800 to 1000 foot lengths of pipe for placement in the canal. HDPE pipe is usually delivered in 50 foot lengths. To weld HDPE pipe you place 2 sticks of pipe in the welding machine. The pipe is held in the machine by hydraulic jaws that clamp the pipe. The jaws ride on a carriage which allows you to move one pipe side to side. You set your fusion pressure based upon size and thickness of pipe. You clean the ends with alcohol. You then trim the pipe with the rotating facer which shaves off a 1/8 to1/4 inch of HDPE to a virgin surface. You then remove the facer and place the Teflon heating plate between the two ends and heat the pipe for 5-10 minutes to a molten 475 degrees F. You then remove the heat plate and fuse the pipe together at the preset pressure. You then allow the weld to cool for 30-60 minutes. Once cool the weld is stronger than the pipe. You unclamp the pipe and pull the stick forward and add another stick to the machine and repeat the process until you reach the desired length. TSID then drags the stick to the canal and places it in the canal. Once the 5000 feet of 42" is in the canal, we move the welding machine to the joining weld location.

For large diameter pipe this normally requires 3 large excavators to lift pipe in and out of the machine. Once the 42" is finished then we repeat the process for the 36" and 32 "pipe. We then tape tracer wire to the top of the pipes for the whole 5000 foot length for future locates.

After all the pipe is placed we start the backfill process with bedding sand until we have 2 foot of cover over the top of the pipe. TSID compacts the sand around the pipe using a plate compactor on the end of a cat 312 excavator. Every 1320 feet we install continuous acting Air Vac valves and every 2640 we install Cla-Val or waterman Pressure relief valves that will open up in the event of a water hammer and protect the pipeline. TSID has a welding machine that allows us to weld butt fusion saddles with stems an stainless steel NPT threads onto the top of the pipe for 2" to 6" ARV or PRV installations. For larger valves we use a mechanical 2 piece clamshell with a flange that wraps the whole diameter of the pipe and bolts together. We also use the clamshells for large on farm turn outs 8" to 24".

This process will be repeated for phase 8 which will include 4400 feet of 42" HDPE pipe (DR 32.5 63 psi), 1685 feet of 28" and 2650 feet of 26"HDPE pipe DR 15.5 139 psi.

This process will be repeated for phase 9 which will include 4600 feet of 42" HDPE pipe (DR 32.5 63 psi), 1540 feet of 22" and 3400 feet of 12"HDPE pipe DR 13.5 160 psi.

The Net Meter/Micro Hydro portion of the project will consist of four separate turbine/generator units. The 25 kW unit will have a separate meter because it is small enough to take advantage of Federal and State mandated net meter requirements. Central Electric Coop (CEC) will net meter this power. The clean green renewable power generated by this unit will be used to offset power consumed by TSID, 150 horse power supplemental turbine groundwater well that TSID runs in August and September when water in Whychus Creek drops off below 50% deliveries. The 25 kW unit will produce about 125,000 kWh annually by running 900 to 950 gallons per minute through the turbine for 7 months during the irrigation season. This turbine will give our farmers and the other Irrigation Districts a working model to copy on farm.

The other three micro hydro units will be 50 kW, 50 kW and 75 kW. TSID is planning to choose 4 different turbine suppliers so that we can test quality, efficiency and cost over the 25 year life of the project. The clean green renewable power generated from these 3 units will be sold to CEC. Bonneville Environmental Foundation (BEF) is paying for the project. TSID will then pay back BEF over time from generation revenues. The 3 turbine/generator units will generate 450,000-750,000 kWh annually depending upon snowpack and available water in Whychus Creek.

Now the fun part. Hydro Red Tape. This is the process that is involved to develop, build, finally generate and go commercial. NRCS is engineering this project. (NRCS through the Bridging the Headgates MOU has engineered all of TSID's piping projects both Main Canal and the farmers on farm projects)
First we will sign an Engineering agreement with NRCS.
Second we will sign a funding agreement with BEF.
We have applied for an Oregon Dept. of Energy (ODOE) Renewably Energy Development Grant (RED)
Submit NOI to FERC for a qualifying conduit hydropower facility. This is a new expedited process that was created by the Hydropower Regulatory Efficiency Act of 2013. This project will qualify as a qualifying conduit hydropower facility and as a result will be exempt from FERC license requirements.
Complete net metering agreement with CEC.
Complete interconnection and PPA agreement with CEC.
Obtain supplemental water right for hydro from OWRD.

Complete engineering with NRCS
Obtain Deschutes County Building permits.
Order equipment
Construct facility
Turn on and test to go commercial

V.A.1 Evaluation Criterion A: Water Conservation (28 points)

Sub criterion No. A.1: Quantifiable Water Savings

Up to 24 points may be allocated based on the quantifiable water savings expected as a result of the project.

Describe the amount of water saved. For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project. Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal (please note, the following is not an exclusive list of eligible project types. If your proposed project does not align with any of the projects listed below, please be sure to provide support for the estimated project benefits, including all supporting calculations and assumptions made).

Phases 7-9 of the Main Canal Pipeline will conserve 1900 acre feet in canal seepage annually depending upon snow pack and available stream flow.

A seepage loss study was performed by Black Rock Consulting. Kevin Crew P.E. determined that there was 8.4 cfs loss in the 6 phase Main Canal project.

8.4 cfs x 1.983 x 240 days (7 month irrigation season and 1 month stock runs) = approximately 4000 acre feet of conserved water.

TSID put1600-1900 acre feet for Phases 4-6 instream marketing the conserved water through DRC.

For Phases 7-9 TSID will put 1400 acre feet instream. The remaining 500 acre feet from phases 7-9 will be used to shore up on farm deliveries especially during short water.

- **What is the applicant's average annual acre-feet of water supply?**
  Historically TSID diverts between 30,000 to 35,000 acre feet. 20,000 – 22,000 in drought years like 1977, 2001 & 2005. The Oregon Water Resources Department maintains a gauging station near TSID's diversion on TSID's main canal. The recorder takes a reading every 15 minutes. Diversion records date back to 1960. Conversion from flood irrigation to sprinkler occurred in the late 1960's into 1970's. Those conservation measures reduced TSID diversion from 50,000 acre feet to 35,000 acre feet.

- **Where is that water currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground, etc.)?**
  Currently the ditch seepage loss of 4 cfs seeps into the ground.

- **Where will the conserved water go?**
  The Main Canal Pipeline project will conserve approximately 4 cfs. TSID will market 3 cfs

to DRC who will create an instream water right held by the State of Oregon. And the 1cfs will be used to shore up on farm deliveries especially during short water.

Please include a specific quantifiable water savings estimate; do not include a range of potential water savings.

Please address the following questions according to the type of project you propose for funding.

(1) Canal Lining/Piping: Canal lining/piping projects can provide water savings when irrigation delivery systems experience significant losses due to canal seepage. Applicants proposing lining/piping projects should address the following:

(a) How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.
A seepage loss study was performed by Black Rock Consulting. Kevin Crew P.E. determined that there was 8.4 cfs loss in the 6 phase Main Canal project.
8.4 cfs x 1.983 x 240 days (7 month irrigation season and1month stock runs) = approximately 4000 acre feet of conserved water.
2100ac/ft for Phases 4-6 and 1900ac/ft for phases 7-9
TSID put 4 cfs (1600-1900 acre feet) for Phases 4-6 instream marketing the conserved water through DRC.
For Phases 7-9 TSID will put 3 cfs (1400 acre feet) instream. The remaining 500 acre feet from all 3 phases will be used to shore up on farm deliveries especially during short water.

(b) How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of data/measurements from representative sections of canals.
A seepage loss study was performed by Black Rock Consulting. Kevin Crew P.E.
See the attached Canal seepage loss study in the Appendix B.

(c) What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?
None.
HDPE pipe is fused together. There are no gaskets or leaks.

(d) What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?

For all 6 phases 1.585 cfs and 754 acre feet per mile.

Phase 7	1.5 cfs	714 acre feet
Phase 8	2.0 cfs	952 acre feet
Phase 9	.5 cfs	238 acre feet

(e) **How will actual canal loss seepage reductions be verified?**
The increased water measured instream at the OWRD gauging station in Sisters.
The reduced annual acre feet diverted by TSID.
The increased measured water delivered on farm.

(f) **Include a detailed description of the materials being used.**
The Mainline Pipe is High Density Polyethylene (HDPE). Current measuring devices on the pipeline are GE Flosonic meters. Open canal measuring devices are Broad Crested Weirs (BCW).
On farm pipe consists of HDPE, PVC and aluminum mainline. Current measuring devices on onfarm pipelines are McCrometer meters. Open canal deliveries are measured by BCW, Cipolletti and Parshall weirs.

Subcriterion No. A.2: Percentage of Total Supply

Up to 4 additional points may be allocated based on the percentage of the applicant's total average water supply (i.e., including all facilities managed by the applicant) that will be conserved directly as a result of the project.

Provide the percentage of total water supply conserved: State the applicant's total average annual water supply in acre-feet. Please use the following formula:

$$\frac{\text{Estimated Amount of Water Conserved}}{\text{Average Annual Water Supply}}$$

1900acre feet divided by 35,000 = 5.4%

V.A.2 Evaluation Criterion B: Energy-Water Nexus (16 points)

Up to 16 points may be awarded based on the extent to which the project increases the use of renewable energy or otherwise results in increased energy efficiency.

For projects that include construction or installation of renewable energy components, please respond to Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery. If the project does not implement a renewable energy project but will increase energy efficiency, please respond to Subcriterion No. B.2: Increasing Energy Efficiency in Water Management. If the project has separate components that will result in both implementing a renewable energy project and increasing energy efficiency, an applicant may respond to both. However, an applicant may receive no more than 16 points total under both Subcriteria No. B.1 and B.2.

Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery

Up to 16 points may be awarded for projects that include construction or installation of renewable energy components (e.g., hydroelectric units, solar- electric facilities, wind energy systems, or facilities that otherwise enable the use of renewable energy). Projects such as small-scale solar resulting in minimal energy savings or production will be considered under Subcriterion No. B.2 below.

TSID has installed a 746 kW hydropower station at their Watson Reservoir location. The range of flows to this hydropower station will be about 20-60 cfs. Discharge from the hydropower station enters Watson Reservoir, and will be used to meet irrigation water demands below the reservoir. Two NRCS designed 54" HDPE pipes (North and South Pipes) are capable of delivering water to the hydro station. The 54" North pipe will be primarily used to supply water to the 746 kW hydropower station. The 54" South Pipe is primarily designed to provide pressurized water to on-farm irrigation systems. A valve station a short distance upstream of the hydropower station has a 48" connector pipe and valve between the North and South Pipes, allowing transfer of water between the two pipes. Riser pipes off the North and South 54" HDPE pipes also allow water to be discharged into Watson Reservoir at this valve station.

During certain times of the year, the inflow into Watson Reservoir will need to be greater than the 60 cfs discharged from the hydro turbine. Discharge from the South pipe will be needed to augment Watson Reservoir inflows. This South Pipe inflow is currently discharged at a pressure range of about 70-80 psi into an energy dissipation rip rap structure before entering Watson Reservoir. The goal of the net metering/micro hydro project is to capture this pressure energy, and convert it into clean, renewable electricity. Electricity generated from the net metering project could be used to offset ground water pumping costs and electrical use at the TSID shop and headquarters/office. TSID is looking at 25kW net meter turbine generator and 3 micro hydro turbines (two 50 kW & one 75 kW). The power from the 3 micro hydro turbines will be sold to Central Electric Coop (CEC). Bonneville Environmental Foundation (BEF) and the Oregon Department of Energy will be the funding sources for this part of the Project. TSID will look at installing different turbine manufactures so that they can be compared and evaluated for quality, efficiency and cost. NRCS's Bill Cronin P.E. who has designed all of TSID's large diameter Pipeline projects will be engineering this project.

The TSID net metering project will explore the feasibility of on farm hydroelectric projects in irrigation delivery pipelines, associated with rural electrical coops. A successful TSID installation will allow for technology transfer to many possible on farm installations, where inline hydro turbines could replace energy wasting pressure reducing valves.

Describe the amount of energy capacity. For projects that implement renewable energy systems, state the estimated amount of capacity (in kilowatts) of the system.

Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.

Describe the amount of energy generated. For projects that implement renewable energy systems, state the estimated amount of energy that the system will generate (in kilowatt hours per year). Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.

If there was unlimited water for the 4 turbines, the 25kW net meter turbine/generator and the 3 micro hydro turbine/generator units (50kW, 50kW & 75 kW) over 210 days could generate 1,000,000 kWh annually. Based on the last three years of operating the bypass on the South 54" HDPE pressurized pipe, TSID is estimating the following annual generation of 573,406 kWh. Below it is broken down by turbine/generator unit.

25 kW 210 days	125,210	kWh
50 kW 150 days	178,872	kWh
50 kW 150 days	107,323	kWh
75 kW 90 days	162,000	kWh
Total kWh	573,406	kWh

Flow (cfs	Net Head Turbine (ft)	Water-Wire Efficiency-Cornell Turbine/Generator %	Power (kW)
2.4	163	75	25
4.8	163	75	50
4.8	163	75	50
7.7	163	75	75
19.7			

The formula used to calculate kWh production is kW times No. of Days times 24 Hours.

The formula used to calculate the power (kW) is (Flow times Net Head divide by (Water-Wire Efficiency-Cornell Turbine/Generator % 75 divide by 100)) divide by 11.81

See attached Hydro production calculations in the Appendix G

Describe any other benefits of the renewable energy project. Please describe and provide sufficient detail on any additional benefits expected to result from the renewable energy project, including:

- **Expected environmental benefits of the renewable energy system**
  The 573,406 kWh will be delivered to CEC through 2 meters. The 25 kW will be a net meter that will reduce TSID's kWh usage by offsetting electrical ground water pumping costs, and electrical use at the TSID shop and headquarters/office. The remaining 448,196 kWh of clean green renewable energy, CEC will be able to use for their Renewable Portfolio Standard (RPS)

requirements to comply with Oregon State Statute.

- **Any expected reduction in the use of energy currently supplied through a Reclamation project**
  None

- **Anticipated beneficiaries, other than the applicant, of the renewable energy system**
  All of the patrons of CEC as well as increasing Oregon's clean green renewable portfolio.

- **Expected water needs of the renewable energy system**
  For all four turbine/generators the total is 19.7 cfs. The breakdown by turbine is listed in the table above. Currently the 2.4-19.7 cfs is discharged through a pipe into Watson Reservoir and the energy is dissipated into a rip rap structure. TSID will apply for a supplemental hydro water right to OWRD as we did for the 746 kW hydro facility. The primary use continues to be irrigation.

AND/OR

Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

If the project is not implementing a renewable energy component, as described in Subcriterion No. B.1 above, up to 4 points may be awarded for projects that address energy demands by retrofitting equipment to increase energy efficiency and/or through water conservation improvements that result in reduced pumping or diversions.

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water management project (e.g., reduced pumping).

For phases 7-9 of the piping project TSID will deliver on farm pressurized water at between 115psi for phase 7 increasing to 136 psi for phase 9. This creates 2 opportunities. First this will eliminate electrical pumps on farm.
And allow for installation of net metering hydro turbines to be installed in front of the Cla-Val pressure reducing valves that are being installed at on farm turnouts to reduce the pressure from for example 115 psi to 65 psi. The purpose of the Net Meter/ Micro Hydro portion of this project is to create an on farm transferable technology that will promote on farm net metering renewable small hydro.

- **Please provide sufficient detail supporting the calculation of any energy savings expected to result from water conservation improvements.**
  If quantifiable energy savings are expected to result from water conservation improvements, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.
  When TSID piped the McKenzie Project we brought pressurized water to 2000 acres. Based upon historical electrical bills from on farm we estimated an average annual conservation of 3,000,000 kWh. This works out to 1500 kWh per

acre per year. So if we pressurize the remaining 2500 acres and the farms apply that water with pivots, wheelines, handline, k-line and pop-ups we would conserve 3,750,000 kWh per year.

- **Please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements?**
  Almost every farm uses centrifugal pumps. 10hp-100hp depending upon size of acreage. The project will eliminate those pumps.

- **Please indicate whether you energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.**
  The energy conservation is created by the net head from diversion for the Main Canal Phases 1-9. Ultimately the majority of delivered on farm pressurized water runs from 80psi up to 136 psi. Phase 7-9 will be in a 115-136 psi range. There is 194 foot of drop from diversion to the hydro plant at Watson reservoir. Then there is 128 foot of drop from Watson Reservoir to McKenzie Reservoir. Drop minus friction loss gives you net head pressure.
- **Does the calculation include the energy required to treat the water?**
  No

- **Will the project result in reduced vehicle miles driven, in turn reducing carbon emissions? Please provide supporting details and calculations. Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).**
  We do not have collected data to date. But the pressurized pipelines with McCrometer meters has greatly reduced our ditch riding requirements from 2 FTE to .5FTE per day.

V.A.3 Evaluation Criterion C: Benefits to Endangered Species (12 points)

Up to 12 points may be awarded for projects that will benefit federally- recognized candidate species or up to 12 points may be awarded for projects expected to accelerate the recovery of threatened or endangered species, or addressing designated critical habitat.

For projects that will directly benefit *federally-recognized candidate species*, please include the following elements:

- **What is the relationship of the species to water supply?**
  Red Band Trout
  The biological status (life history diversity, trends in population abundance and productivity) of red band trout populations is mixed. Red band trout are moderately abundant in the limited amount of headwater tributaries with good

habitat and cool water. Red band trout populations are depressed, however, in main stem rivers and tributaries with degraded riparian zones, poor fish habitat, and warm water. Overall, wild red band trout populations are depressed compared to historical numbers. As a result, red band trout are listed as a state sensitive species and as a Category 2 sensitive species by the USFS.
The principal red band trout production areas existing within the Upper Deschutes Basin include the main stem Deschutes River up to Big Falls, Whychus Creek, the Deschutes River above Crane Prairie Reservoir, the Crooked River below Bowman Dam, and the North Fork Crooked River and tributaries (NPCC 2004). These populations are considered strong and viable.

- **What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?**

  The additional flows in Whychus Creek have already increased the redd counts. Additional water will benefit the riparian habitat and improve spawning and rearing habitat, which in turn improves population numbers.

For projects that will directly accelerate the recovery of *threatened or endangered species or address designated critical habitats*, please include the following elements:

(1) How is the species adversely affected by a Reclamation project?
There are 2 listed species in the Deschutes Basin (Mid-Columbia Steelhead and Bull Trout) that are affected by irrigation withdrawals from the Crooked River by Reclamation Projects.

(2) Is the species subject to a recovery plan or conservation plan under the ESA?

Yes, Bull Trout: USF&W Columbia Bull Trout Recovery Plan
Steelhead: NMFS Mid-Columbia Steelhead Recovery Plan

(3) **What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?**

Additonal flow in Whychus Creek creates a minimum spawning flow, improves riparian habitat, improves foraging and rearing reaches and improves water quality by lowering temperature. All of these improvements will result in the return of over a thousand spawning steelhead adults, which in turn could double the summer steelhead, run in the Deschutes River. That increase in numbers would move the Deschutes population into the highly viable category on the charts listed in NMFS Mid-Columbia Steelhead Recovery Plan. The additional flow also benefits migrating and foraging Bull Trout. Larger Bull Trout have been found recently in Whychus Creek above Alder Springs.

Projects that benefit both federally-recognized candidate species and federally-listed threatened or endangered species or designated critical habitat will receive additional consideration under this criterion. Please see <www.fws.gov/endangered/index.html> for a complete listing of federally-recognized candidate

species and federally-listed threatened or endangered species in your area.

V.A.4 Evaluation Criterion D: Water Marketing (12 points)

Up to 12 points may be awarded for projects that propose developing a new water market. Note: Water marketing does not include an entity selling conserved water to an existing customer. This criterion is intended for the situation where an entity that is conserving water uses water marketing to make the conserved water available to meet other existing water supply needs or uses.

Briefly describe any water marketing elements included in the proposed project. Include the following elements:

- **Estimated amount of water to be marketed**

  Phases 7-9 will conserve approximately 4 cfs. TSID will market 3 cfs to DRC. The remaining conserved water will help shore up on farm deliveries in the District

- **A detailed description of the mechanism through which water will be marketed (e.g., individual sale, contribution to an existing market, the creation of a new water market, or construction of a recharge facility)**

  As in the past projects like the Cloverdale pipeline, Fryrear pipeline, the 5 phases of the McKenzie pipeline, the Uncle John lateral and the Main Canal Pipeline phases 1-6, TSID has contracted with DRC to apply for a new in stream water right.
  Under Oregon's water laws, water right holders who implement a water conservation project can apply for a new water right equivalent to the amount of water that the project conserved. This project will create a new instream water right under Oregon law. It will legally protect 3 cfs from river mile 26.5 to the mouth of Whychus Creek during the summer irrigation season.

Number of users, types of water use, etc. in the water market

Marketed Conserved water will be used for environmental uses. The 3 cfs dedicated in-stream will benefit fish and water quality. Whychus is listed on the 303d list for temperature. The City of Sisters, its residents and visitors will benefit from increased flow that helps enhance recreational experiences on Whychus Creek for everyone. The remainder of the conserved water will be used for irrigation. The 1 cfs that will be used to shore up deliveries will benefit the 180 farms in TSID.

- **A description of any legal issues pertaining to water marketing (e.g., restrictions under Reclamation law or contracts, individual project authorities, or State water laws)**

  TSID has not had any legal issues or problems regarding recent water marketing transactions. All 12 conserved water applications for the Cloverdale pipeline,

Fryrear pipeline, the 5 phases of the McKenzie pipeline, the Uncle John lateral and the Main Canal Pipeline phases 1-4 moved through the process and proposed final orders were issued. Final water right certificates were issued on all 12 projects and phases as they were completed. Main Canal Phase 5 will be certificated in 2015 and phase 6 in 2016.

- **Estimated duration of the water market**
  The Conserved Water application process with the Oregon Department of Water Resources will create a transferred in-stream water right that is held in perpetuity by the State of **Oregon.**

V.A.5 Evaluation Criterion E: Other Contributions to Water Supply Sustainability (14 points)

Up to 14 points may be awarded for projects expected to contribute to a more sustainable water supply. This criterion is intended to provide an opportunity for the applicant to explain 1) how the project relates to a completed WaterSMART Basin Study; 2) how the project could expedite future on-farm improvements; 3) how the project will build resiliency to drought; and/or 4) how the project will provide other benefits to water supply sustainability within the basin. An applicant may receive the maximum 14 points under this criterion based on discussion of one or more of the numbered sections below.

Subcriterion E.2: Expediting Future On-Farm Irrigation Improvements

Up to 14 points may be awarded for projects that describe in detail how they will directly expedite future on-farm irrigation improvements, including future on- farm improvements that may be eligible for NRCS funding.

If the proposed projects will help expedite future on-farm improvements please address the following:

- **Include a detailed listing of the fields and acreage that may be improved in the future.**
  See attached spreadsheets in Appendix F

- **Describe in detail the on-farm improvements that can be made as a result of this project. Include discussion of any planned or ongoing efforts by farmers/ranchers that receive water from the applicant.**

  To date TSID has assisted its farmers and ranchers in the completion of over 100 on farm EQIP contracts. TSID has a current AWEP partnership agreement with NRCS, as well as a past agreement for the Mckenzie Pipeline Project. TSID plans to apply in 2015 for a 4 year RCPP project funding for on farm so that the remaining 64 farms are able to complete private lateral and on farm improvements that save water and energy.
  These improvements will include piping open ditches, replacing flood irrigation with wheelines, pods and pivots. As well as replacing wheelines and handlines with pivots which increases irrigation efficiency from 70% to 95%. Elimination of electrical pumping stations. Instituting IWM practices with water scheduling

results submitted annually to NRCS.
A number of larger acreage TSID farmers have already started upgrading and improving their on farm irrigation systems with pivots and pop ups for pasture in anticipation of the coming pressurized water.

- **Provide a detailed explanation of how the proposed WaterSMART Grant project would help to expedite such on-farm efficiency improvements.**

  In order to save water and save energy it's important for TSID to install a pressurized main canal pipeline. TSID has partnered with BOR and NRCS over the last 15 years. Through Bridging the Headgates MOU and other authorities NRCS has designed all the large mainline projects as well as the on farm. As a result Over 4785 of the 7572 acres are pressurized on farm. The two programs WaterSmart and EQIP go hand in hand. Without the main canal being piped it is impossible to deliver pressurized water on farm. The WaterSmart grant is essential to show NRCS that the on farm improvements will receive pressurized water to save water and energy. This will help TSID to be successful in obtaining a NRCS RCPP partnership agreement.

Fully describe the on-farm water conservation or water use efficiency benefits that would result from the enabled on-farm component of this project. Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.

On-farm seepage loss depends on how far the water has to travel from the main canal to the point of dispersion. The AWEP program is voluntary and each individual farmer has to qualify.
Currently there are a total of 64 on farm projects that would be contracted with 64 producers.

6 producers will install on farm conservation practices that would be started in 2015 and completed by 2016. Currently TSID has AWEP Partnership Agreement with NRCS. Even though the program has been replaced with RCPP, TSID is hopeful that our farmers will be able to secure regular EQIP funds for these improvements.

These improvements include piping open ditches, replacing floodirrigation with wheelines, pods and pivots. Elimination of electrical pumping stations. Instituting IWM practices with water scheduling results submitted annually to NRCS. These seven farms comprise 645.5 irrigated acres. With the piping and the elimination of one of our largest flood irrigators the annual water conservation will amount to at least 300 acre feet as well as eliminating 500,000 kWh hours in electrical pumping. The conserved water calculation is simple. A flood irrigator watering 145 acres will use 5-6 acre feet per acre raising hay. Converting to pivot will reduce that to 3 acre feet per acre. 2 x 145 ac ft = 290 acre feet. Additional savings will come from piping and on farm improvements.

- 22 producers will install on farm conservation practices that would be started in 2016 and completed by 2017.
  This on farm segment would finish piping the Cloverdale canal. TSID has

measured the ditch loss in the Cloverdale canal and this group of EQIP contracts would conserve over 1-2 cfs. (Approximately 475-950 acre feet annually)

- 13 producers will install on farm conservation practices that would be started in 2017 and completed by 2018.
  This on farm segment would pipe the cement ditch which would conserve 200 acre feet annually. TSID has worked with the 5 farms to quantify the ditch loss. There is a permanent parshall weir at the ditch turn out and each farmer has a weir or McCrometer meter at their on farm delivery. The pressurization of 12 farms will conserve approximately 1,000,000 kWh per year through the elimination of the electrical pumps. The 13th farm is the other large flood irrigator who will convert to pivot and sprinkler irrigation thus saving another 50-100 acre feet per year.

- 23 producers will install on farm conservation practices that would be started in 2018 and completed by 2019. Most of those farmers are already piped so the energy conservation will be over 750,000 kWh per year. The Hermans ditch will be piped and result in 50-75 acre feet in conserved water saved.

  TSID will be working with all 64 producers and NRCS to make sure that all on farm conservation practices are installed and completed on time and to NRCS EQIP contract standards.

  The 3000 acres that would be served by the Main Canal Pipeline Project phases 7-9 would conserve over 1000 acre feet annually on farm. Seepage loss analysis was identified in TSID's SOR piping and conserved water assessment.

Some of the community benefits are:

- Water conservation (elimination of existing canal seepage and evaporation), augmented in-stream flows in Whychus Creek that will benefit Redband and Bull Trout, Chinook and Steelhead.
- Improved control of water in conveyance and delivery system.
- Reduction of operational losses. (Spills & Canal Breeching)
- Pressurization of delivery to all irrigators. Leading to less reliance on electrically-driven pumps.
- Electrical power conservation

Projects that include significant on-farm irrigation improvements should demonstrate the eligibility, commitment, and number or percentage of shareholders who plan to participate in any available NRCS funding programs. Applicants should provide letters of intent from farmers/ranchers in the affected project areas.

The 6 farms scheduled for 2015 all signed up with NRCS in 2014 and are eligible for funding in 2015. TSID works with its Farmers located along each phase of the Watson-McKenzie Main Canal Pipeline Project as construction progresses. Historically we have had 90-100% sign up success on our Main

Canal depending upon the phase. With the Mckenzie Pipeline project we had 29 of the 31 farms receive EQIP contracts. TSID's farmers and ranchers ultimately will have 140 -150 eligible contracts out of the 180 farms (78 plus percent). 35 of the farms are located in a subdivision (Hurtley Pipeline) of small irrigated parcels 2-9 irrigated acres each. It was not possible to qualify the Hurtley subdivision for a pooled EQIP project with NRCS. However thanks to a project that was done with DRC and the Oregon Dept of energy 26 of those parcels have a state of the art HDPE pipeline and variable drive turbine pumping station. NRCS did however do the engineering for the project. TSID would be glad to supply letters from our farmers in the future. However the application page limitation prevents us from doing so right now.

The AWEP on-farm portion of the project has been divided into four phases. Upper District farmers and ranchers in the purchase fuel, fertilizer, equipment, and supplies from local businesses, as well as creating both on- and off-farm jobs. Deschutes County businesses depending on local farms and ranches to purchases goods and services include—feed stores, farm and ranch supply stores, hardware stores, veterinarians, tractor and implement dealers, seed and fertilizer companies, irrigation planners, suppliers, and technicians, livestock auction yards, and numerous other spin-off businesses.
Over the last fifteen years, farmers and ranchers in the TSID have experienced increasing pressure from the regulatory demands of the ESA (bull trout and the reintroduction of anadromous fish). Furthermore, continually rising prices (for fuel, fertilizer, electric power, and equipment) and housing development pressures have pushed many farms and ranches in Central Oregon out of business. For example, rising electric rates have increased from .01 per kilowatt to .05/kw over the last 20 years. A farmer, who was paying $5,000 a year for electricity in 1984, today pays $25,000.
Farmers and ranchers in the project area are taking proactive steps to adopt and fund natural resource improvements for salmon, steelhead, and bull trout recovery rather than wait for potential enforcement actions. This project will help sustain agriculture and the environment.
Oregon State's land use laws were created to protect farmland. Presently, the irrigated agricultural acres in the lower TSID are zoned for exclusive farm use (EFU). This zone requires a person to own at least 63 irrigated acres to build a home on their property and controls subdividing valuable farmlands for suburban residential use.
TSID agricultural irrigators are motivated to conserve irrigation water and do what is necessary so that both fish and farms can thrive for future generations.

- **Describe the extent to which this project complements an existing or newly awarded NRCS funded project.**

The Watson-McKenzie Main Canal Pipeline project will allow TSID to tie into and pressurize 2 existing NRCS pooled EQIP projects. (The Brown and Z-Ditch)

The Brown project involved the elimination of approximately an 8000ft ditch.

The 5 farms that the ditch served were all converted from on farm flood irrigation to pressurized sprinklers. The project conserves over 500-acre feet per irrigation season.

The Z-Ditch project replaced approximately 6000 ft of open ditch with HDPE. This project was a huge improvement for the 5 landowners. Prior to the piping each landowner received water just 1 day a week. The project conserves from 200 to 300 acre feet per season.

Subcriterion E.4: Other Water Supply Sustainability Benefits

Up 10 points may be awarded for projects that include other benefits to water supply sustainability.

Projects may receive up to 10 points under this sub-criterion by thoroughly explaining additional project benefits, *not already described above*. Please provide sufficient explanation of the additional expected project benefits and their significance. Additional project benefits may include, but are not limited to, the following:

- **Will the project make water available to address a specific concern? For example:**
  - **Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?**
    Yes. The ultimate goal is stretch TSID's available water supplies through conservation because they are affected by both climate change, drought and population growth. This will enable us to achieve sustainable farming and address ESA & CWA challenges that require using conserved water to restore stream flows.

  - **Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.**
    TSID depends on all live flow from Whychus Creek. Snow pack can be affected by climate variation and drought. Historically TSID diverts between 30,000 to 35,000 acre feet and delivers 20,000 acre feet on farm. In low snow pack drought years like 1977, 2001 & 2005 where TSID diverted 20,000 – 22,000 acre feet. With the whole system piped and minimal system loss TSID will be able to supply a substantial greater amount of water on farm as well as supply protected instream flows. In 1977 TSID was only able to deliver 10% water on farm.

  - **Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?**
    Yes. ESA and CWA litigation in other basins has interrupted water supply many times. TSID is working with the other 6 Irrigation Districts in the Deschutes Basin on a basin-wide habitat conservation plan. Currently both USFW and NMFS are encouraging all 7 districts to be proactive and implement as many conservation projects as possible to avoid future litigation.

- **Will the project make additional water available for Indian tribes?**
  Yes. The additional in stream flow travels down Whychus Creek to the Deschutes River into Lake Billy Chinook where the Confederated Tribes of Warm Springs & PGE will benefit from both flow for fish and additional power production.

- **Will the project make water available for rural or economically disadvantaged communities?**
  Yes. Restoring the anadromous salmon and steelhead runs in the Upper Deschutes basin are an important cultural and economic goal for the Confederated Tribes of Warm Springs. This project will create more water for those fisheries.

- **Does the project promote and encourage collaboration among parties?**
  Yes. Whychus Creek has become a rallying point for stream restoration in the upper Deschutes Basin. Local, state, federal, and tribal agencies and organizations have coalesced around anadromous fish reintroduction, and restoration efforts have received enormous support from local communities and funding partners. Local and regional media, including the Bend Bulletin, the Oregonian, the Sisters Nugget, High Country News, and Oregon Public Broadcasting, have highlighted the reintroduction of salmon and steelhead to the upper Deschutes Basin as an historic event. The Deschutes River Conservancy and its partners have built on this public support to develop strong relationships with local communities and state, federal, and tribal agencies. These relationships are instrumental to our success in restoring Whychus Creek.

  - **Is there widespread support for the project?**

Yes. Local, state, federal, and tribal agencies and organizations have consistently identified Whychus Creek as a priority for restoration, and they have consistently listed stream flow as the primary factor limiting fish production in the creek. The following plans and assessments identify the limiting factors that this project addresses, highlight the efficacy of the stream flow restoration, or prioritize the ecological importance of restoration in Whychus Creek.

- Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan (National Marine Fisheries Service 2008)
  - The Deschutes River Westside summer steelhead population, which includes Whychus Creek, is considered "High Risk" for viability
- Reintroduction and Conservation Plan for Anadromous Fish in the Upper Deschutes River Sub-basin, Oregon. Edition 1: Spring Chinook Salmon and Summer Steelhead (Oregon Department of Fish and Wildlife and Confederated Tribes of the Warm Springs Reservation 2008)
  - Whychus Creek steelhead smolt production potential estimated to be up to 1/3 of total steelhead smolt production potential in upper Deschutes Basin (p. 18)

- Whychus Creek was historically the strongest producer of steelhead in the Upper Deschutes Subbasin and is a priority for restoration (p. 48) Deschutes Basin Restoration Priorities, Oregon Watershed Enhancement Board, 2007
    - The alteration of the hydrologic regime is identified as having a "High Impact" on ecosystem health.
- Upper Deschutes Agricultural Water Quality Management Area Plan, Oregon Department of Agriculture, 2007
    - Identifies low streamflow in Whychus Creek as a contributing factor to poor water quality (p. 35)
    - Under "Recommended Actions" for irrigation management, the plan suggests improving irrigation efficiency and instream flows through canal piping (p. 14)
- Deschutes Subbasin Plan, Northwest Power and Conservation Council, 2004
    - The Deschutes Subbasin Plan provides almost 80 pages of site specific findings, objectives and management strategies (p. 11 to 87) many of which involve increasing stream flow in reaches adversely affected by irrigation diversions. Key habitat objectives for Whychus Creek include increasing minimum instream flow to meet the instream water right of 33 cfs below Indian Ford Creek (p. 73)
- Squaw Creek Watershed Action Plan, Upper Deschutes Watershed Council, 2002
    - Goal 1 of the Action Plan recommends improving instream flows (p. 2)
    - Goal 2 recommends improving water quality (p. 2)
- Sisters/Why-Chus Watershed Analysis, US Forest Service, 1998
    - Identifies low streamflow as a key limiting factor affecting stream temperatures and riparian habitat health (p. 202)
    - Directs agencies and partners to restores streamflow while reducing conflicts between irrigators and stream dependent fish and wildlife (p. 215)
- Upper Deschutes River Basin Water Conservation Study, Bureau of Reclamation, 1997
    - Identifies Main Canal lining/piping as a major water conservation opportunity (p. 103)
- Upper Deschutes River Fish Management Plan, Oregon Department of Fish and Wildlife 1996

- Habitat limitations include low streamflow and poor water quality in dewatered sections (p. 56)

- Whychus Creek Watershed Assessment, Deschutes County Soil and Water Conservation District, 1994
  - Recommends improvements to the efficiency of the irrigation canal system (p. 38)
  - Identifies the McKenzie Canyon project as a priority action (Abstract, p. 1)

To the extent that stream channel, floodplain, and riparian functions are dependent on sufficient stream flows, this stream flow restoration project complements numerous other watershed activities including:

- **Reintroduction of spring Chinook and ESA listed summer steelhead.** The Oregon Department of Fish and Wildlife, Confederated Tribes of the Warm Springs Indian Reservation, and Portland General Electric began releasing steelhead fry in Whychus Creek during the spring of 2007 and Chinook fry during the spring of 2009. Efforts to reestablish anadromous fish in Whychus Creek will rely heavily on the availability of instream flows during key time periods, particularly during the spring and summer.

- **Oregon Department of Fish and Wildlife Minimum Instream Flows.** The Oregon Department of Fish and Wildlife (ODFW) has established minimum instream flows for Whychus Creek. Because these water rights carry a very junior priority date (1990) they are not met during the irrigation season except during extremely high flow events. The *Whychus Creek – Three Sisters Irrigation District Main Canal Piping Project* utilizes the Oregon Conserved Water Statute and therefore protects water instream that is co-equal to the irrigation district's 1895 water right, helping meet state requested minimum instream flows during the irrigation season each year.

- **Deschutes Land Trust Preserve Restoration.** The Deschutes Land Trust is actively working to restore the Camp Polk and Rimrock Ranch preserves adjacent to Whychus Creek. These preserves will eventually provide high quality habitat for fish and wildlife once restoration is complete. Restoration is largely focused on riparian areas, stream channel function, and flood-plain connectivity. Without adequate instream flows in Whychus Creek, restoration of riparian areas, stream channels, and flood-plains would be difficult to achieve.

- **Upper Deschutes Watershed Council Habitat Restoration.** In addition to working closely with the Deschutes Land Trust on their preserve restoration activities, the Upper Deschutes Watershed Council is engaged in numerous riparian habitat projects along Whychus Creek that depend on streamflow restoration projects to be successful. They plan to screen and restore both low and high flow passage at diversion dams on lower Whychus Creek. The Upper Deschutes Watershed Council has partnered with the Deschutes National Forest to develop and implement a comprehensive fish passage, fish screening, and habitat restoration design at the TSID dam site.

- **Deschutes County Soil and Water Conservation District On-Farm Irrigation Efficiency.** The Deschutes Soil and Water Conservation District has been aggressively pursuing on-farm conservation opportunities in the Whychus Creek watershed for several years. In partnership with local farmers, the Soil and Water Conservation District has been providing technical and financial assistance to improve water application efficacy, reduce power consumption, and eliminate operational losses.

- **US Forest Service Restoration Program.** The Crooked River National Grasslands and the Deschutes National Forest have both implemented numerous restoration projects in recent years for the purpose of improving water quality and riparian habitat along Whychus Creek. These projects include road obliteration near the creek, riparian plantings, dispersed camping set-backs, and educational programs to improve public awareness of the importance of Whychus Creek. The Deschutes National Forest recently partnered with the Upper Deschutes Watershed Council to develop and implement a comprehensive fish passage, fish screening, and habitat restoration design at the TSID dam site.

- **Three Sisters Irrigation District.** TSID has committed to working with local partners to improve conditions in Whychus Creek. TSID has completed fish passage and screening at its diversion dam. Due to the efforts of the last 15 years there is now over 28 cfs of protected permanent flow in Whychus Creek.

    - **What is the significance of the collaboration/support?**
      The significance of the collaboration and support is impressive and essential. Litigation has plagued the Columbia River Bi-op for decades. Salmon and Steelhead recovery and delisting efforts have required billions of dollars. Collaboration, cooperation and community efforts are the only way that the Northwest will solve these issues. Without this significant level of support from all of the collaborative partners we would not be able to build upon the success of our cumulative projects to achieve a successful anadramous reintroduction in our Basin.

    - **Will the project help to prevent a water-related crisis or conflict?**
      Yes, this project will help to prevent future conflict and litigation by helping make the anadromous re- introduction a success. It will also help mitigate future conflict over short water supplies caused by drought or climate change.

    - **Is there frequently tension or litigation over water in the basin?**
      There is tension. But because of the proactive approach of the 7 Irrigation Districts (DBBC) and all of our partner's; cooperation, collaboration and conservation have led to solutions that prevent litigation.

    - **Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?**
      Yes. This project encourages TSID's farmers to make on farm energy and water conservation improvements so they can take advantage of the pressurized water.

- **Will the project increase awareness of water and/or energy conservation and efficiency efforts?**
  Yes. Two fold. First TSID continues to do tours during and after construction for schools, Universities, Watershed groups, Irrigation Districts, Environmental Groups, Hydro Power Associations, Elected officials, State and Federal Agencies, and many more.
  Second the 25kW Net Meter turbine and the 3 micro-hydro turbines (two 50 kW and one 75kW) that TSID will install on the Pressurized Pipe will be excellent project case studies for on farm net metering installations as well as micro hydro facilities on small pipelines.

  - **Will the project serve as an example of water and/or energy conservation and efficiency within a community?**
    Yes. This project will serve as a water and energy conservation project as well as a clean green renewable energy generation project not only in Sisters, Oregon but in all of Central Oregon and the Northwest.

  - **Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?**
    Yes. This project is meant to be a teaching tool for other Irrigation Districts as well as on farm net metering hydro. The HDPE large diameter pipe is an incredible technology that has a minimum shelf life of 100 years the potential to last 1000 years. Considering that TSID is dedicating instream flow to the State of Oregon in perpetuity it is nice to install a product that will not be aging infrastructure in 10 plus generations. TSID constantly shares its projects installation and funding models with other Irrigation Districts and the public.

  - **Does the project integrate water and energy components?**
    Yes. The piping conserves water and delivers pressurized water on farm which in turn eliminates pumps and conserves energy. The 25 kW net metering hydro is meant to be duplicated on farm in the future in as many as 60 on farm installations.

V.A.6 Evaluation Criterion F: Implementation and Results (10 points)

Up to 10 points may be awarded for the following:

Subcriterion No. F.1: Project Planning

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

Does the project have a Water Conservation Plan, System Optimization Review (SOR), and/or district or geographic area drought contingency plans in place? Does the project relate/have a nexus to an adaptation strategy developed as part of a WaterSMART Basin Study)? Please self-certify, or provide copies of these plans where appropriate, to verify that such a plan is in place.

Provide the following information regarding project planning:

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Basin Study, drought contingency plan, or other planning efforts done to determine the priority of this project in relation to other potential projects.

Currently TSID has finished completing a System Optimization Review of TSID whole system. This effort involves over 35 TSID member volunteers who helped with the end product which is an Agricultural Water Management & Conservation Plan (AWMCP). In the AWMCP TSID focused on these items: The TSID SOR consists of these items

(1) Piping & conserved water assessment.
(2) Measurement & telemetry plans for TSID.
(3) Fish screen and passage upgrade design.
(4) Completed and updated GIS database
(5) Expansion of current IWM (Irrigation Water Management) Program.
(6) Plan for a Whychus Branch of DWA Water Bank.

A copy cannot be attached due to the page length of the SOR/AWMCP and the application restriction of only a 75 pages.

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts, and identify any aspect of the project that implements a feature of an existing water plan(s).

The following plans and assessments identify the limiting factors that this project addresses, highlight the efficacy of the stream flow restoration, or prioritize the ecological importance of restoration in Whychus Creek.

- Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan (National Marine Fisheries Service 2008)
  - The Deschutes River Westside summer steelhead population, which includes Whychus Creek, is considered "High Risk" for viability

- Reintroduction and Conservation Plan for Anadromous Fish in the Upper Deschutes River Sub-basin, Oregon. Edition 1: Spring Chinook Salmon and Summer Steelhead (Oregon Department of Fish and Wildlife and Confederated Tribes of the Warm Springs Reservation 2008)
  - Whychus Creek steelhead smolt production potential estimated to be up to 1/3 of total steelhead smolt production potential in upper Deschutes Basin (p. 18)

- Whychus Creek was historically the strongest producer of steelhead in the Upper Deschutes Subbasin and is a priority for restoration (p. 48) Deschutes Basin Restoration Priorities, Oregon Watershed Enhancement Board, 2007
  - The alteration of the hydrologic regime is identified as having a "High Impact" on ecosystem health.

- Upper Deschutes Agricultural Water Quality Management Area Plan, Oregon Department of Agriculture, 2007
  - Identifies low streamflow in Whychus Creek as a contributing factor to poor water quality (p. 35)
  - Under "Recommended Actions" for irrigation management, the plan suggests improving irrigation efficiency and instream flows through canal piping (p. 14)
- Deschutes Subbasin Plan, Northwest Power and Conservation Council, 2004
  - The Deschutes Subbasin Plan provides almost 80 pages of site specific findings, objectives and management strategies (p. 11 to 87) many of which involve increasing stream flow in reaches adversely affected by irrigation diversions. Key habitat objectives for Whychus Creek include increasing minimum instream flow to meet the instream water right of 33 cfs below Indian Ford Creek (p. 73)
- Squaw Creek Watershed Action Plan, Upper Deschutes Watershed Council, 2002
  - Goal 1 of the Action Plan recommends improving instream flows (p. 2)
  - Goal 2 recommends improving water quality (p. 2)
- Sisters/Whychus Watershed Analysis, US Forest Service, 1998
  - Identifies low streamflow as a key limiting factor affecting stream temperatures and riparian habitat health (p. 202)
  - Directs agencies and partners to restores streamflow while reducing conflicts between irrigators and stream dependent fish and wildlife (p. 215)
- Upper Deschutes River Basin Water Conservation Study, Bureau of Reclamation, 1997
  - Identifies Main Canal lining/piping as a major water conservation opportunity (p. 103)
- Upper Deschutes River Fish Management Plan, Oregon Department of Fish and Wildlife 1996
  - Habitat limitations include low streamflow and poor water quality in dewatered sections (p. 56)
- Whychus Creek Watershed Assessment, Deschutes County Soil and Water Conservation District, 1994
  - Recommends improvements to the efficiency of the irrigation canal system (p. 38)
  - Identifies the McKenzie Canyon project as a priority action (Abstract, p. 1)

Subcriterion No. F.2: Readiness to Proceed

Points may be awarded based upon the extent to which the proposed project is capable of proceeding upon entering into a financial assistance agreement.

Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. ***(Please note, under no circumstances may an applicant begin any ground-disturbing activities****—including grading, clearing, and other preliminary activities—on a project before environmental compliance is complete and Reclamation explicitly authorizes work to proceed).*

Phase 7

Sept 2015	Cultural Resources for phases 7-9 SHPO consultation is complete. Work with BOR to complete CE for Phases 7-9
Sept 2015	Pipeline Engineering is complete
Oct/Nov 2015	Order Pipe and Materials
Nov 2015	Start Construction of Pipeline (Excavation)
Dec 2015	Weld and Install Pipeline
Jan-Mar 2016	Backfill Pipeline
April 2016	Turn on and deliver pressurized water

Phase 8

Oct/Nov 2016	Order Pipe and Materials
Nov 2016	Start Construction of Pipeline (Excavation)
Dec 2016	Weld and Install Pipeline
Jan-Mar 2017	Backfill Pipeline
April 2017	Turn on and deliver pressurized water

Phase 9

Oct/Nov 2017	Order Pipe and Materials
Nov 2017	Start Construction of Pipeline (Excavation)
Dec 2017	Weld and Install Pipeline
Jan-Mar 2018	Backfill Pipeline
April 2015	Turn on and deliver pressurized water

Net Meter/Micro Hydro Generation

Jan-August 2015	Sign Engineering agreement with NRCS.
	Sign funding agreement with BEF.
	Apply for ODOE Renewably Energy Development Grant (RED)
	Submit NOI to FERC for a qualifying conduit hydropower facility.
	Complete net metering agreement with CEC.
	Complete interconnection and PPA agreement with CEC.
	Obtain supplemental water right for hydro from OWRD.
	Complete engineering with NRCS
Oct 2015	Obtain Deschutes County Building permits.
Nov 2015	Order equipment
Jan-Mar 2016	Construct facility
April 2016	Turn on and test to go commercial

NRCS RCPP/AWEP on farm improvements

Spring 2015	Apply for 4 year RCPP Partnership Agreement

Please explain any permits that will be required, along with the process for obtaining such permits. Identify and describe any engineering or design work

performed specifically in support of the proposed project.

The Pipeline engineering from NRCS for the Watson/McKenzie Main Canal Pipeline Project is complete (21 pages).
Cultural Resources and SHPO concurrence is complete as per the attached MOA See the Appendix.
TSID will work with BOR to complete a CE as was done for phases 4-6. (R12AP13011)
The Net Meter/Micro Hydro Generation portion of the project is slightly more complicated, however due to the Hydropower Regulatory Efficiency Act of 2013 this project will qualify as a qualifying conduit hydropower facility. CEC's net metering agreement is a standard off the shelf policy for 25 kW or less. Because the total facility is 200 kW or less BPA does not get involved in the process as they did for the 700kW facility. TSID has experience executing all of the other agreements as well as obtaining the needed permits listed below having just gone commercial on our 700 kW hydro plant August of 2014.

Jan-August 2015	Sign Engineering agreement with NRCS.
	Sign funding agreement with BEF.
	Apply for ODOE Renewably Energy Development Grant (RED)
	Submit NOI to FERC for a qualifying conduit hydropower facility.
	Complete net metering agreement with CEC.
	Complete interconnection and PPA agreement with CEC.
	Obtain supplemental water right for hydro from OWRD.
	Complete engineering with NRCS
Oct 2015	Obtain Deschutes County Building permits.

All NRCS AWEP on-farm projects will be contracted individually with each farmer. On private lateral piping projects, TSID will work with the farmers to do the work unless the farmer choses to do the work himself or hire a private contractor.
Since the pipeline will be constructed on TSID and patron-owned properties, no permits other than NEPA compliance will be required.

Subcriterion No. F.3: Performance Measures

Points may be awarded based on the description and development of performance measures to quantify actual project benefits upon completion of the project.

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved, marketed, or better managed, or energy saved). For more information calculating performance measure, see Section VIII.A.1 "FY2015 WaterSMART Water and Energy Efficiency Grants: Performance Measures."

Note: All WaterSMART Grant applicants are required to propose a "performance measure" (a method of quantifying the actual benefits of their project once it is completed). A provision will be included in all assistance agreements with WaterSMART Grant recipients describing the performance measure, and requiring the recipient to quantify the actual project benefits in their final report to Reclamation upon completion of the project. If information regarding project benefits is not available immediately upon completion of the project, the financial

assistance agreement may be modified to remain open until such information is available and until a Final Report is submitted. Quantifying project benefits is an important means to determine the relative effectiveness of various water management efforts, as well as the overall effectiveness of WaterSMART Grants. The Main Canal stretch to be piped in phases 7-9 has an average seepage loss of 4 cfs. Over a 240 day irrigation & stock water season (March- Nov.), that translates into 1900 acre feet per season.

The Deschutes River Conservancy will complete Oregon's Conserved Water application process with the Oregon Department of Water Resources on behalf of TSID. This process will create a new instream water right of at 3 cfs with a multiple year certificate. (1895 priority date) The in-stream right will protect flows from April 1 to October 31 and at other times when TSID is diverting water. The additional 3 cfs instream will increase the protected flow in 2015 from 28 to 31 cfs.

The District intends to use the Oregon Conserved Water Statute to allow the saved water to be allocated instream (OAR 690-018-0010 to 690-018-0090 and ORS 537.455 to 537.500). The District will not divert the saved water at its diversion point, but instead leave the conserved water in the river where it will be protected by the Oregon Water Resources Department from other withdrawals and measured at the gauging stations located at Camp Polk and the City of Sisters. Preliminary saved water was determined to be a minimum of 3 cfs for the period of April 1st through October 31th of each year. Increased stream flow in Whychus Creek will help reconnect the creek with the floodplain, create more backwater and pool habitat for fish and improve the health of the riparian habitat community.

The Deschutes River Conservancy will focus on monitoring both the water outputs and economic outputs from this project. The Oregon Water Resources Department maintains a near-real-time, web accessible stream gauge downstream from the TSID diversion at Sisters (river mile 21). The Deschutes River Conservancy will use this gauge to determine whether stream flows are meeting targets on a daily basis, and will use this gauge to determine overall implementation. Protected flows instream are monitored daily by OWRD, DRC, TSID and the public.

It is anticipated that the project will enhance water quality in Whychus Creek by increasing the rate of flow and thus reducing the impacts of solar heating and low dissolved oxygen levels. Increased stream flow may also increase riparian vegetation, leading to more canopy cover and reduced stream flow temperatures. Whychus Creek is currently listed under the Oregon DEQ 303(d) criteria for temperature (DEQ, 2002). Improved stream flow conditions will benefit fish and wildlife communities that inhabit the Whychus Creek ecosystem.

ODF&W as well as fish biologists from (NOAA, USFW, USFS, and TRIBES/PGE) who are involved with the anadramous reintroduction will continue to monitor the benefits of additional flow for fish.

DEQ and the Upper Deschutes Watershed Council, who have 15 water quality monitoring stations on Whychus Creek as well as the Tribes, will continue to monitor temperature and other water quality benefits from increased flow.

The Net Meter/Micro Hydro turbines will be tested thoroughly for guaranteed efficiency and output. These results will be documented and available prior to finishing phase 9 of the piping project. They will be available for the Final Report. The other performance

measure will be comparing different micro turbine manufacturers for quality, efficiency and cost. TSID will also work with NRCS to document the process for installing a net meter turbine on farm and working out the interconnect with Central Electric Coop. The purpose of this project is to have transferable technologies that can be shared with farmers and Irrigation Districts.

Sub-criterion No. F.4: Reasonableness of Costs

Points may be awarded based on the reasonableness of the cost for the benefits gained.

Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s).

For all projects involving physical improvements, specify the expected life of the improvement in number of years and provide support for the expectation (e.g., manufacturer's guarantee, industry accepted life-expectancy, description of corrosion mitigation for ferrous pipe and fittings, etc.). Failure to provide this information may result in a reduced score for this section.

The total project cost will be $4,367,101 for the pipeline and $317,000 for the Net Meter/Micro hydro.

TSID Watson/McKenzie Main Canal Piping Project phases 7-9 will conserve 4 cfs (1900 acre feet annually).

HDPE pipe has the potential to last 1000 years. The HDPE pipe manufacturers are hesitant to put that in writing. They refer to HDPE pipe as a 100 year pipe. Currently all HDPE pipe manufacturers offer a 50 year warrantee.

The 3 phases of the pipeline will bring pressurized water to 2500 acres. Based upon electrical savings on past projects, TSID estimates annual kWh per acre at 1200-1500. So total on farm conserved would be 3,000,000 kWh annually.

The Net Meter/Micro hydro turbine/generator units will generate on average 573,406 kWh of clean green renewable energy annually for at least 25 years. Unit life can exceed 25 years however this is a conservative estimate from turbine suppliers and industry sources.

V.A.7 Evaluation Criterion G: Additional Non-Federal Funding (4 points)

Up to 4 points may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-Federal funding provided.

Non-Federal Funding / Total Project Cost

$3,737,906 divided by $4,737,906 = 78.9%

V.A.8 Evaluation Criterion H: Connection to Reclamation Project Activities (4 points)

Up to 4 points may be awarded if the proposed project is in a basin with connections to Reclamation project activities. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.

(1) **How is the proposed project connected to Reclamation project activities?**
TSID does not serve Reclamation project lands and does not receive any Reclamation project water. But additional instream flows in Whychus Creek which flow into the Deschutes River will help with BOR's minimum stream flow requirements from NOAA and US Fish as per the ongoing Section 7 consultation for the Pelton and Round Butte Dam FERC re-licensing agreement. Those flows will also benefit Wild and Scenic reaches on the Deschutes River. Whychus Creek also was historically an important spawning and rearing stream for steelhead and Chinook salmon until passage was curtailed around Pelton and Round Butte Dams on the Deschutes River. FERC re-licensing is requiring passage of anadromous fish at these two dams which makes the restoration of Whychus Creek a priority of fishery agencies, tribes, and others. The focus of this project is to conserve water by improving irrigation delivery efficiencies so that adequate flows can be maintained in Whychus Creek. Whychus Creek historically (prior to the dams) has provided 1/3 of the steelhead runs in the Deschutes River. If the anadromous fish runs are restored through spawning in Whychus Creek then pressure to restore the Crooked River runs by additional flow requirements in the Crooked River from North Unit ID and Ochoco ID will be lessened. NOAA fisheries have viewed past conservation projects that TSID and BOR have partnered on as benefiting the whole basin. TSID continued efforts will be beneficial to all members of the Deschutes Basin Board of Control (DBBC) as well as BOR during the ongoing Deschutes Basin Habitat Conservation Plan process.

(2) **Does the applicant receive Reclamation project water?**
No

(3) **Is the project on Reclamation project lands or involving Reclamation facilities?**
No

(4) **Is the project in the same basin as a Reclamation project or activity?**
Yes

(5) **Will the proposed work contribute water to a basin where a Reclamation project is located?**
Yes

(6) **Will the project help Reclamation meet trust responsibilities to Tribes?**
Yes

IV.D.1 Environmental and Cultural Resources Compliance

To allow Reclamation to assess the probable environmental and cultural resources impacts and costs associated with each application, all applicants must respond to the following list of questions focusing on the NEPA, ESA, and NHPA requirements. Please answer the following questions to the best of your knowledge. If any question is not applicable to the project, please explain why. Additional information about environmental compliance is provided in Section IV.D.4. "Project Budget," under the discussion of "Environmental and Regulatory Compliance Costs," and in Section VIII.B., "Overview of Environmental and Cultural Resources Compliance Requirements."

Note: Applicants proposing a Funding Group II project must address the environmental and cultural resources compliance questions for their entire project, not just the first 1-year phase.

TSID and BOR have already completed a MOA with SHPO for all phases (4-9) of this project. The only environmental requirement should be a CE for the piping. TSID has also completed NEPA with DEQ/EPA on all phases of the project (4-9) for the Clean Water State Revolving Loan (R91413) that TSID secured to pipe all phases of the Watson McKenzie Main Canal Pipeline. This will cover all three years.

If you have any questions, please contact your regional or area Reclamation office (see <www.usbr.gov/main/regions.html>) with questions regarding ESA compliance issues. You may also contact Mr. Josh German at 303-445-2839 or jgerman@usbr.gov, for further information.

1) **Will the project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.**

   Wildlife: Bald eagles are known to inhabit the lower portion of the Whychus Creek Watershed with incidental use in the Lower Division of the TSID project area. Two bald eagle nesting sites (currently not in use) have been observed at Watson Reservoir. The following wildlife species are found in the project area: mule deer, elk, coyotes, ground squirrels, mountain lions, common ravens, turkey vultures, golden eagles, and red-tailed hawks. Irrigated agriculture has provided forage for numerous wildlife species. Also, irrigation ponds provide water for many wildlife species. Watson Reservoir and Whychus creek and nearby farm ponds will provide adequate water for wildlife.

   Pipeline Construction:

   All construction of the pipeline will occur in the Main Canal. The Main Canal has an 1891 right of way width of 50 feet on both sides of the canal. A water truck will be used to control dust as needed. Winter months tend to be snowy and wet around Sisters which helps with dust control. Working in the canal will minimize all impacts.

Beneficial impacts from additional in stream flow for fish and water quality will be realized immediately upon completion of the pipeline.

2) **Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?**

There are no listed species in the project area. The BOR CE from the Main Canal project phases 4-6 did not turn up any listed species during the NEPA process.

ESA species present in Whychus Creek include MCR steelhead and Bull Trout. Bull trout were consulted on by the Natural Resources Conservation Service (NRCS) for all phases of the McKenzie Canyon project. The NRCS received a concurrence from the Fish and Wildlife Service for a not likely to adversely affect determination. The ESA status, distribution, life history, and habitat requirements for MCR steelhead are described in Reclamation's Final Biological Assessment on Continued Operation and Maintenance of the Deschutes River Basin Projects and Effects on Essential Fish Habitat under the Magnuson-Stevens Act (2003).

In May 2007, the Oregon Department of Fish and Wildlife, in cooperation with the Confederated Tribes of the Warm Springs Reservation, began the process of reintroducing hatchery-raised fingerling steelhead into Whychus Creek, a tributary of the Deschutes River above the Pelton Round Butte Hydroelectric (PRB) Project. The reintroduction is part of a commitment made in the recent Federal Energy Regulatory Commission (FERC) relicensing of the PRB Project. Also in May 2007, NOAA Fisheries sent a letter to the Deschutes Basin Board of Control stating that the juvenile steelhead used for this out planting are considered ESA listed (threatened) fish.

Environmental baseline conditions for Deschutes River MCR steelhead are described in Reclamation's Biological Assessment (Reclamation, 2003). Whychus Creek currently has in-stream flow, water quality, and habitat features that may be limiting factors to successful steelhead trout reintroduction. Historical reports indicated that Whychus Creek once served as the primary spawning and rearing habitat for steelhead trout in the upper Deschutes Basin (Nehlsen 1995). Since 1895, the flows of Whychus Creek have been diverted for irrigation uses and have limited the rearing habitat of steelhead trout populations (Nehlsen 1995). The steelhead trout populations were extirpated in 1968 five years after the completion of the Pelton-Round Butte (PRB) complex. Federal re-licensing of the PRB complex resulted in steelhead trout reintroduction to Whychus Creek beginning in 2007.

Whychus Creek is Section 303(d) listed for temperature impairment because it does not meet state temperature standards set to protect salmon and trout rearing and migration.

The proposed action will increase streamflow in Whychus Creek by an average of 2.6 cfs during the irrigation season (April – October) from TSID's diversion at RM 27 on Whychus Creek to Lake Billy Chinook. Historically, Whychus Creek would run dry during most summers from the town of Sisters downstream to Alder Springs as a result of irrigation withdrawals. Through water conservation

efforts, protected flows of 24 cfs now flow through the town of Sisters during irrigation season, and are protected to Lake Billy Chinook. TSID Main Canal Pipeline Project will improve water quality and quantity conditions in Whychus Creek that will subsequently benefit the reintroduction of MCR steelhead into this basin.

It was Reclamation's determination that Reclamation's proposed action of funding the TSID's McKenzie Pipeline Phase I 2025 Project, may affect, but is not likely to adversely affect, listed MCR steelhead in Whychus Creek. Effects from the proposed action will be beneficial to MCR steelhead. The Main Canal pipeline phases 7-9 is the same type of project as the Main Canal phases 1-3 and 4-6. However the pipeline will be installed on private farmland. No public lands are involved.

3) **Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.**
There are no jurisdictional wetlands along the Main Canal. There are areas of seepage along the canal. Cottonwood, willows, and other vegetation grows sporadically along portions of the open canal.

4) **When was the water delivery system constructed?**
The Main Canal was constructed in 1891.

5) **Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.**
The head gate in Watson Reservoir which was built in 1964 will remain as is. The Main Canal itself will be replaced with side-by-side a 42" gravity flow HDPE pipe and a 36", 32", 28", 26", 22" and 12" pressurized HDPE pipe (graduating down in size as flows decrease). Seven lift structures that were built out of concrete and pressure-treated wood will be replaced with turnouts with valves and meters. All these structures have been rebuilt over the years and were replaced in the 1970s and 1980s.

6) **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.**
Yes, all canals in Central Oregon irrigation projects are eligible to the NRHP.

7) **Are there any known archeological sites in the proposed project area?**
None

8) **Will the project have a disproportionately high and adverse effect on low income or minority populations?**
No

9) **Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?**

No

(10) Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No. The Main Canal project phases 7-9 runs through all private property. As in the past, TSID will work with each individual farmer to plant dryland native grasses to deal with weed control. In some cases the ground over the pipeline will be active farmland.

IV.D.2 Project Budget

The project budget includes: (1) Funding Plan and Letters of Commitment, (1) Budget Proposal, (3) Budget Narrative and (4) Budget Form.

Funding Plan and Letters of Commitment

Describe how the non-Reclamation share of project costs will be obtained. Reclamation will use this information in making a determination of financial capability.

Project funding provided by a source other than the applicant shall be supported with letters of commitment from these additional sources. This is a mandatory requirement. Letters of commitment shall identify the following elements:

(1) The amount of funding commitment
(2) The date the funds will be available to the applicant
(3) Any time constraints on the availability of funds
(4) Any other contingencies associated with the funding commitment

The funding plan must include all project costs, as follows:

1) How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant (e.g., reserve account, tax revenue, and/or assessments).

Funding from Pelton, OWEB and NFWF (CBWTP)/other through DRC will be $1,500,000. Funding from TSID will be $256,113 in cash that will be used to pay for labor, fuel, equipment rental and other project costs. TSID will borrow this money from the Clean Water Revolving Loan Fund. The remaining $1,658,900 will consist of in-kind (which will include backfill and equipment). TSID currently owns a 100,000 lb excavator, Cat 312 excavator, D-8 Cat, off road dump truck, front end loader, 4 dump trucks and backhoe which they will use to complete the projects.
As in the past, TSID will work with DRC to acquire funding from National Fish & Wildlife Foundation and the National Forest Foundation to cover the remaining $299,599.
TSID will execute an agreement with BEF to pay for the Net Meter/Micro Hydro Facility for the $317,000. BEF will loan the money to TSID for the project and TSID will pay BEF back with generation revenues over a 12-14 year period. TSID is also applying for an Oregon Department of Energy Renewable Energy Development grant for $110,000. We will know in August of 2015 if we have secured the RED grant. It would shorten up our payback period to 9 years.

2) Describe any in-kind costs incurred before the anticipated project start date

that you seek to include as project costs. Include:

3) **What project expenses have been incurred**

a) How they benefitted the project
b) The amount of the expense
c) The date of cost incurrence

Feb 2015	No Cost	Sign Engineering agreement with NRCS.
Feb 2015	No Cost	Sign funding agreement with BEF.
Jan 2015	$500	Apply for ODOE Renewably Energy Development Grant (RED)
Feb 2015	No Cost	Submit NOI to FERC for a qualifying conduit hydropower facility.
April 2015	Engineering Costs TBD	Complete net metering agreement with CEC.
July 2015	Engineering Costs TBD	Complete interconnection and PPA agreement with CEC.
Aug. 2015	$500	Obtain supplemental water right for hydro from OWRD.
Aug. 2015	$27,000	Complete engineering with NRCS

All of the above actions (Engineering, Funding, Qualifying conduit project approval from FERC, Approval and agreements from CEC, Supplemental Water Right Certificate from OWRD and a complete set of Engineering from NRCS which allows us to pull building permits and put out the turbine/generator RFP. All of the above allow for smoother transition into November Construction Start.

4) **Provide the identity and amount of funding to be provided by funding partners, as well as the required letters of commitment.**
Deschutes River Conservancy will provide $1,500,000 from Pelton Fund, Oregon Watershed Enhancement Board, NFWF Columbia Basin Water Transaction Fund.
Bonneville Environmental Foundation will provide $317,000.
Three Sisters Irrigation District Will provide cash and in-kind.
TSID has a DEQ CWSRF loan to cover cash and contingency if needed.
See Attached letters from DRC and BEF in Appendix C

5) **Describe any funding requested or received from other Federal partners. Note: other sources of Federal funding may not be counted towards your 50 percent cost share unless otherwise allowed by statute.**
None at this point.

6) **Describe any pending funding requests that have not yet been approved, and explain how the project will be affected if such funding is denied.**
The above requests have not yet been approved. As a backup TSID will borrow needed funds from the Clean Water Revolving Loan Fund.
Based on past history with both DRC & OWEB & Pelton, TSID is confident that this project will funded by DRC efforts to secure funding. Currently TSID is working with DRC to sell additional conserved water for cash. This will occur

prior to Oct 2015. TSID will cover any unfunded portion with cash until DRC can secure funding. TSID have a long history of projects and funding has always been secured.
For the pipeline phases 7-9, these are the same funding partners who funded phases 4-6. DRC just received money from NFWF for the TSID Phase 4 OWRD Instream Water Right Certificate that the Department finalized end September 2014. Pelton Fund and OWEB funded all three phases 4-6 for the Watson/McKenzie Main Canal Pipeline Project.

BEF will fully fund the Net Meter/Micro Hydro portion of the project whether we receive the ODOE RED grant or not. It might take 24 months instead of 12 to finish the project without the ODOE Red grant.

Please include the following chart (table 1) to summarize your non-Federal and other Federal funding sources. Denote in-kind contributions with an asterisk (*). Please ensure that the total Federal funding (Reclamation and all other Federal sources) does not exceed 50 percent of the total estimated project cost.

Table 1.—Summary of non-Federal and Federal funding sources

Funding sources	Funding amount
Non-Federal Entities:	
Three Sisters Irrigation District * Inkind and cash	$1,915,0
Pelton Fund	$457,2
OWEB	$750,0
DRC	$298,5
Bonneville Environmental Foundation	$317,0
Non-Federal Subtotal:	**$3,737,9**
Other Federal Entities	
Reclamation Funding:	$1,000,0
Federal Subtotal:	**$1,000,0**
TOTAL PROJECT FUNDING:	**$4,737,9**

For applicants submitting a proposal under Funding Group II, please include the following chart (table 2) to summarize your Federal funding request by year.

Table 2.—Funding Group II funding request

	Funding Group II request		
	Year 1 (FY 2015)	Year 2 (FY 2016)	Year 3 (FY 2017)
Funding requested	$500,000	$300,000	$200,000

Budget Proposal

The project budget shall include detailed information on the categories listed below and must clearly identify all project costs. Unit costs shall be provided for all budget items including the cost of work to be provided by contractors.

Additionally, applicants shall include a narrative description of the items included in the project budget, including the value of in-kind contributions of goods and services provided to complete the project. It is strongly advised that applicants use the budget proposal format shown below on tables 3 and 4 or a similar format that provides this information. If selected for award, successful applicants must submit detailed supporting documentation for all budgeted costs.

Table 3.—Funding sources

Funding sources	Percent of total project cost	Total cost by source
Recipient funding	78.9%	$ -3,737,906
Reclamation funding	21.1%	$ -1,000,000
Other Federal funding		$ -
Totals	**100%**	**$ -4,737,906**

Table 4.—Sample budget proposal format

See attached Budget in Appendix E

Budget Narrative

Submission of a budget narrative is mandatory. An award will not be made to any applicant who fails to fully disclose this information. The budget narrative provides a discussion of, or explanation for, items included in the budget proposal. Include the value of in-kind contributions of goods and services and sources of funds provided to complete the project. The types of information to describe in the narrative include, but are not limited, to those listed in the following subsections.

Salaries and Wages

Indicate program manager and other key personnel by name and title. Other personnel may be indicated by title alone. For all positions, indicate salaries and wages, estimated hours or percent of time, and rate of compensation proposed. The labor rates should identify the direct labor rate separate from the fringe rate or fringe cost for each category. All labor estimates, including any proposed subcontractors, shall be allocated to specific tasks as outlined in the recipient's technical project description. Labor rates and proposed hours shall be displayed for each task.

Marc Thalacker, TSID Manager Salary $90,000.00.

Hourly is $43.27 and fringe is $13.21 per hour.

Currently TSID has 5 heavy equipment operators on staff. For budgeting purposes we used $23.16 per hour, which works out to a wage cost of $20 and fringe benefit cost of $3.16. The pipeline will be built by TSID staff.

The Net Meter/Micro Hydro will also be built by TSID staff.

Manager and Office administration is treated as a direct cost. For budgeting purposes we used $21.09 per hour, which works out to a wage cost of $17 and fringe benefit cost of $3.93.

All hours and activities are documented on time sheets.

Clearly identify any proposed salary increases and the effective date.

Generally, salaries of administrative and/or clerical personnel will be included as a portion of the stated indirect costs. If these salaries can be adequately documented as direct costs, they should be included in this section; however, a justification should be included in the budget narrative.

Fringe Benefits

Indicate rates/amounts, what costs are included in this category, and the basis of the rate computations. Indicate whether these rates are used for application purposes only or whether they are fixed or provisional rates for billing purposes. Federally approved rate agreements are acceptable for compliance with this item.

For Manager Administration Fringe benefits average 27.39% of salary costs and include S.S. & Medicare employer contribution, State & Federal Unemployment tax and vacation and sick time allowance costs.

For Office Administration Fringe benefits average 22.23% of salary costs and include S.S. & Medicare employer contribution, State & Federal Unemployment tax and vacation and sick time allowance costs.

For Heavy Equipment Operators Fringe benefits average 13.6% of salary costs and include S.S. & Medicare employer contribution, State & Federal Unemployment tax costs.

Travel

Include purpose of trip, destination, number of persons traveling, length of stay, and all travel costs including airfare (basis for rate used), per diem, lodging, and miscellaneous travel expenses. For local travel, include mileage and rate of compensation.

There is no travel by the District anticipated for this project. Any travel costs from sub-contractors or engineers will be in paid for with BEF funds and should only include IRS approved mileage.

Equipment

Itemize costs of all equipment having a value of over $5,000 and include information as to the need for this equipment, as well as how the equipment was priced if being purchased for the agreement. If equipment is being rented, specify the number of hours and the hourly rate. Local rental rates are only accepted for equipment actually being rented or leased for the project. If equipment currently owned by the applicant is proposed for use under the proposed project, and the cost to use that equipment is being included in the budget as in-kind cost share, provide the rates and hours for each piece of equipment owned and budgeted.
These should be ownership rates developed by the recipient for each piece of equipment. If these rates are not available, the U.S. Army Corp of Engineer's

recommended equipment rates for the region are acceptable. Blue book, Federal Emergency Management Agency (FEMA), and other data bases should not be used.

TSID uses ACOE recommended rates minus fuel costs. Fuel is itemized separately. The hourly cost for each piece of equipment is listed on the budget form in Appendix E.

Materials and Supplies

Itemize supplies by major category, unit price, quantity, and purpose, such as whether the items are needed for office use, research, or construction. Identify how these costs were estimated (i.e., quotes, past experience, engineering estimates, or other methodology).

All materials and supplies are identified on the attached budget sheet. These are based on past bids as well as current market information.

Contractual

Identify all work that will be accomplished by subrecipients, consultants, or contractors, including a breakdown of all tasks to be completed, and a detailed budget estimate of time, rates, supplies, and materials that will be required for each task. If a subrecipient, consultant, or contractor is proposed and approved at time of award, no other approvals will be required. Any changes or additions will require a request for approval. Identify how the budgeted costs for subrecipients, consultants, or contractors were determined to be fair and reasonable.

TSID is not planning to hire any contractors for the pipeline. We will do the work ourselves on the pipeline. NRCS has already completed the engineering on the pipeline.

For the Net Meter/Micro Hydro TSID will do all the Construction Work. Bonneville Environmental Foundation will be paying for the whole project. TSID will repay BEF with hydro revenues over time (12-14 year payback).

Bill Cronin P.E. from NRCS will Engineer the project. TSID will execute a cooperative reimbursable agreement with NRCS for Bill Cronin's time. For the last agreement the rate was $52.67 per hour.

TSID will also need some electrical engineering. We will continue to use Dave Lucke who did the electrical engineering for the 746 kW hydro plant that we just finished. His hourly rate is $130. Dave designed the interconnect with CEC and since we will be interconnecting in the same location his knowledge is essential to keeping costs to a minimum. We are budgeting $15,000 for electrical engineering.

TSID will also have to hire an electrician to wire everything. We will put that out to bid after all the approvals, permits and design have been finished and obtained. We are budgeting $15,000 for the electrician.

NRCS reimbursement agreement is very fair and reasonable.

Dave Lucke's rate is also reasonable by industry standards.

The rate for Hage electric from the Dalles for our last hydro project was $67 per hour (PW). This also was reasonable by industry standards.

Environmental and Regulatory Compliance Costs

TSID has budgeted a total of $15,000 for environmental costs which is less than 1%. The reason for this is that this pipeline will be built on private property and as a result there is no federal nexus. For the previous phases of the project where there was a federal nexus (the project was installed on Forest Service lands) the federal agencies involved found no significant environmental impact. TSID and BOR have already completed a MOA with SHPO for all phases (4-9) of this project. The only environmental costs should be a CE for the piping. TSID has also completed NEPA with DEQ/EPA on all phases of the project (4-9) for the Clean Water State Revolving Loan (R91413) that TSID secured to pipe all phases of the Watson McKenzie Main Canal Pipeline.

Reporting

Recipients are required to report on the status of their project on a regular basis. Failure to comply with reporting requirements may result in the recipient being removed from consideration for funding under future funding opportunities. Include a line item for reporting costs (including final project and evaluation costs). Please see Section VI.E.2 "Program Performance Reports" for information on types and frequency of reports required.

The line item for the Manager includes time for reporting compliance requirements.

Other Expenses

Any other expenses not included in the above categories shall be listed in this category, along with a description of the item and what it will be used for. No profit or fee will be allowed.

Indirect Costs

For this project the District should not have any indirect costs. All costs associated with the project are direct and can be documented as such.

Total Costs

Indicate total amount of project costs, including the Federal and non-Federal cost-share amounts.

Funding sources	Funding amount
Non-Federal Entities:	
Three Sisters Irrigation District * Inkind and cash	$1,915,013
Pelton Fund	$457,294
OWEB	$750,000
DRC	$298,599
Bonneville Environmental Foundation	$317,000
Non-Federal Subtotal:	**$3,737,906**
Other Federal Entities	
Reclamation Funding:	$1,000,000
Federal Subtotal:	**$1,000,000**
TOTAL PROJECT FUNDING:	**$4,737,906**

See Appendix E for more detail

Budget Form

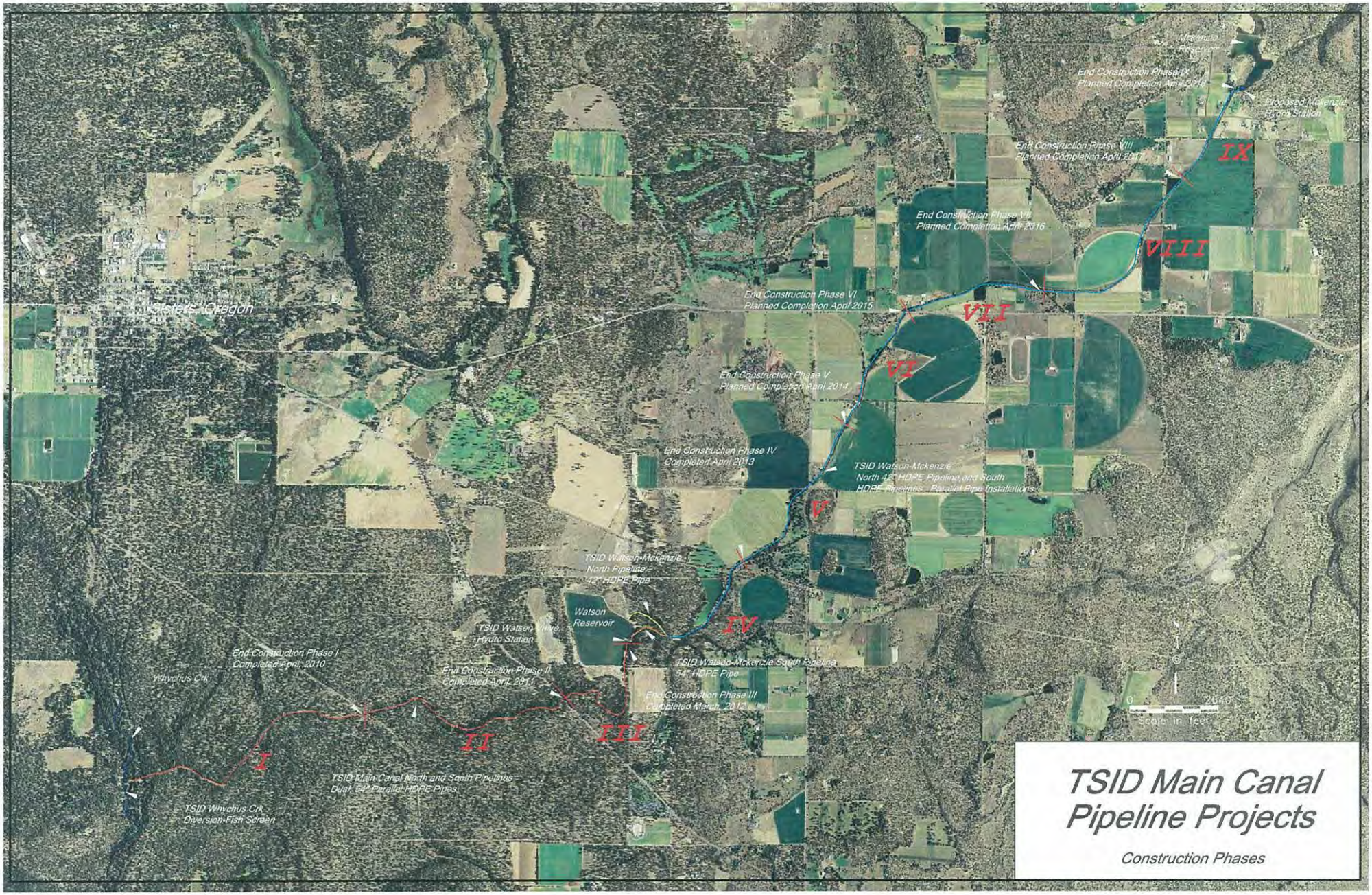
See Appendix E for Budget Form

IV.E Funding Restrictions

See Section III.E.3 for restrictions on incurrence and allowability of pre-award costs.

TSID will be working on engineering and permits for the Net Meter/Micro Hydro Facility prior to Award Notifications:

Jan-August 2015 Sign Engineering agreement with NRCS.
Sign funding agreement with BEF.
Apply for ODOE Renewably Energy Development Grant (RED)
Submit NOI to FERC for a qualifying conduit hydropower facility.
Complete net metering agreement with CEC.
Complete interconnection and PPA agreement with CEC.
Obtain supplemental water right for hydro from OWRD.
Complete engineering with NRCS


Mckenzie Reservoir
End Construction Phase IX
Planned Completion April 2018
Proposed Mckenzie Hydro Station
End Construction Phase VIII
Planned Completion April 2017
IX
End Construction Phase VII
Planned Completion April 2016
VIII
End Construction Phase VI
Planned Completion April 2015
VII
VI
End Construction Phase V
Planned Completion April 2014
End Construction Phase IV
Completed April 2013
TSID Watson-Mckenzie
North 42" HDPE Pipeline and South
HDPE Pipelines - Parallel Pipe Installations
V
TSID Watson-Mckenzie
North Pipeline
42" HDPE Pipe
Watson Reservoir
IV
TSID Watson Drive
Hydro Station
End Construction Phase I
Completed April 2010
End Construction Phase II
Completed April 2011
TSID Watson-Mckenzie South Pipeline
54" HDPE Pipe
End Construction Phase III
Completed March 2012
III
II
I
Wrychus Crk
TSID Main Canal North and South Pipelines
Dual 54" Parallel HDPE Pipes
TSID Wrychus Crk
Diversion-Fish Screen
Scale in feet
TSID Main Canal
Pipeline Projects
Construction Phases

BLACK ROCK
CONSULTING

April 30,2012

Mr. Aaron Maxwell
Deschutes River Conservancy ("DRC")
P.O. Box 1560
Bend, OR 97709

SUBJECT: THREE SISTERS IRRIGATION DISTRICT MAIN CANAL LOSS SUMMARY STUDY

Dear Mr. Maxwell:

Per the request of the Deschutes River Conservancy (DRC), Black Rock Consulting performed seepage loss estimates on the Three Sisters Irrigation District Canal over a two day period (April 26th and 27th, 2012). Equipment used for the study included a standard foot/tenths-of-foot top setting wading rod, Marsh McBirney transducer and digital velocity meter, fiberglass measuring tape (ft and inches), wooden lathe, and standard metal tape measure and weir stick for rating rectangular weir-type sections. Black Rock Consulting (BRC) was assisted by the District's Manager and operations staff during the course of the measurements.

Per the map provided by the DRC, the seepage loss study area was established to be from the Watson Reservoir to the Mckenzie Reservoir along the District's open canal system. Generally, the study each day was performed starting at the Watson Reservoir gate and then working downstream to each of the future project phase points established by the DRC. For the most part, users were turned off during the measurements with the exception of a few patrons that were measured and reported. The loss evaluation performed on April 26th was considered a lower flow study with the beginning flow rate at approximately 27 CFS (Watson) and the ending flow rate at approximately 15 CFS (Mckenzie ramp flume) whereas the loss evaluation performed on April 27th was intended to emulate high flow with a starting flow rate of approximately 47 CFS and an ending flow rate of approximately 27 CFS (McKenzie ramp flume). The intent was to provide a range of losses over the normal range of District seasonal flow rates.

In its map provided to BRC, the DRC had indicated Phase 4 coincident with the Watson Rerservoir gate, and indicated several project phases through the ending of Phase 9 at the McKenzie Reservoir. The only adjustment to this series of measurement points was that the Phase 7 point was not taken and was replaced by a check structure downstream of the Phase 8 check structure. This additional measurement point was the Cement check structure, or "lift" as the District describes the check structures. The reason for this change was the short distance between Phase 8 and Phase 9 start points, the limited time to insure all measurements were taken within a single day, and the lack of an existing structure at the Phase 8 point.

Clearly, the more iterations of seepage loss measurement, the better confidence in the results. Given a two day measurement period, we believe a reasonable indicator of seepage loss is established, however error is introduced with the lack of a larger data set over a longer period of record. The District has performed some internal checking from time to time and has generally estimated losses in the subject canal reach to be similar to those found during this two day

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evaluation. BRC has included an "error adjustment" of 5% and has reduced the loss estimate by this value. This is a coarse adjustment assuming 2 ½% error in the Watson gauge and 2 ½% error in the McKenzie rating assuming the Watson gauge is reading high and the McKenzie gauge is reading low.

The attached spreadsheets indicate the measurement results for April 26th and April 27th and also include any noted irrigation use and side gate leakage losses during the time of the study. Additionally, on April 27th, a direct feed of 6.42 CFS was delivered to the Cyrus pond located between the Watson Reservoir and the Arnold Check (start of Phase 5) in an effort to emulate higher flows in that segment. Based upon the state of each check structure, a determination was made as to the potential to rate the structure. The Arnold (Phase 5), Phase 8, and Cement check structures were sufficiently well vented, with acceptable upstream pools, weir board in decent repair, fairly regular and level rectangular weir-type sections that we were able to rate directly. On April 26th, we used the digital gauge reading at Watson and the rating curve for the McKenzie ramp flume, and wading rod rated the Tumalo check and the Phase 9 check locations (Tumalo check was blown-out at the middle slot and Phase 9 check was leaking beneath the existing check boards). We also back-checked the Watson gauge with a wading rod rating. On April 27th, we followed the same approach as on April 26th, except that we also added a wading rod rating of the McKenzie ramp flume and we did not re-rate the Watson digital gauge reading.

The loss summary table at the end of each section indicates the estimated loss by segment and the overall loss from top to bottom in the reach studied. The flow rates indicated in red are either measured irrigation in use or noted side gate losses. Interestingly, the losses measured for each day are very similar, even though the second day an appreciable amount of flow was added to the system. It did appear that generally the canal banks consisted of finer grained soil and the canal bottom in areas waded for rating were generally gravelly. This may indicate that more losses pass out the bottom of the canal than through the banks of the canal, therefore raising water on the banks does not appreciably increase canal loss. This finding is consistent with the District's unofficial historical measurements.

In summary, the estimated canal loss ranged from approximately 8.0 CFS to approximately 8.4 CFS for the two day rating period. The segment by segment loss estimates, total daily loss estimate and average segment by segment loss are as follows:

SEGMENT	April 26th	April 27th	Segment Average
Watson (Phase 4) to Phase 5	1.35	2.16	1.76
Phase 5 to Phase 6	2.73	2.41	2.57
Phase 6 to Phase 8	0.09	0.20	0.15
Phase 8 to Cement Check	0.93	1.47	1.20
Cement Check to Phase 9	2.40	2.08	2.24
Phase 9 to McKenzie Res.	0.51	0.05	0.28
TOTAL	**8.02**	**8.38**	**8.20**

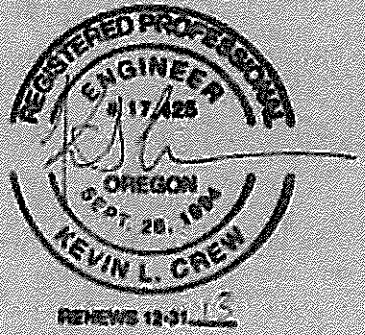
Should you have any questions on this matter or require further investigation, please call me.

Sincerely,

BLACK ROCK CONSULTING

Kevin L. Crew, P.E.
Principal

Attachments: Segment Map; Spreadsheets of Loss Measurements, April 26th and April 27th




End Phase 9
N44.305°
Begin Phase 9
N44.295°
Begin Phase 8
Begin Phase 7
126
McKenzie Hwy
505° W121.495° W121.485° W121.475° W121.465° W121.455° W121.445° W121.435° W121.42
N44.285°
Begin Phase 6
N44.275°
Begin Phase 5
Phase 4
Google earth

15d

4/26/12

Phase 4 Top End (Watson Reservoir)

Rod Set Sta	Depth	V-60%	V-20%	V-80%	Ave V (ft/s)	Segment Area	Q (CFS)
1	0						
2	0.2	0.95			0.95	0.53333333	0.50666667
3	0.6						
4	0.95	1.23	1.21	1.21	1.22	1.66666667	2.03333333
5	0.95						
6	0.95	1.52	1.5	1.52	1.515	1.9	2.8785
7	0.95						
8	0.95	1.6	1.59	1.59	1.595	1.9	3.0305
9	0.95						
10	0.95	1.71	1.69	1.59	1.675	1.9	3.1825
11	0.95						
12	0.95	1.79	1.71	1.83	1.78	1.9	3.382
13	0.95						
14	0.95	1.73	1.73	1.79	1.745	1.9	3.3155
15	0.95						
16	0.95	1.88	1.78	1.88	1.855	1.9	3.5245
17	0.95						
18	0.95	1.73	1.61	1.75	1.705	1.9	3.2395
19	0.95						
20	0.95	1.4	1.37	1.32	1.3725	1.7	2.33325
21	0.65						
22	0.3	1.17			1.17	0.63333333	0.741
23	0						
						Q (CFS) =	**28.16725**
Watson Gauge Reading						**Q(CFS) =**	**27.6**

Phase 5 Top End Arnold Check

3 Segment Weir Rating

	d1	d2	d3	d4	Length	Ave h	Q (CFS)
Cell 1	0.83	0.83	0.83	0.83	4.27	0.83	10.3340064
Cell 2	0.74	0.7	0.67	0.62	4.33	0.6825	7.8736275
Cell 3	0.69	0.69	0.68	0.67	4.38	0.6825	7.96750645
						Q (CFS) =	**26.17514**

25d

Brockew **250 GPM**
Wilse **100 GPM**

Phase 6 Top End
3 Segment Weir - Blow-Out Mid Section with Angled Center Section - No Acceptable

20 GPM Est. Loss to Closed Side Gate (located below rating shown below)

Rated Canal Above Check Structure
Lat 44 16.897N Long 121 28.167W

Rod Set Sta	Depth	V-60%	V-20%	V-80%	Ave V (ft/s)	Segment Area	Q (CFS)
1	0.9						
2	1.3	0.45	0.65	0.39	0.485	2.43333333	1.18016667
3	1.45						
4	1.55	0.72	0.84	0.5	0.695	3.03333333	2.10816667
5	1.55						
6	1.65	0.86	0.96	0.72	0.85	3.3	2.805
7	1.75						
8	1.85	0.94	1.08	0.81	0.9425	3.63333333	3.42441667
9	1.85						
10	1.8	0.92	1.14	0.87	0.9625	3.63333333	3.49708333
11	1.8						
12	1.8	0.94	1.11	0.86	0.9625	3.6	3.465
13	1.8						
14	1.73	0.76	0.94	0.7	0.79	3.48666667	2.75446667
15	1.7						
16	1.6	0.71	0.72	0.56	0.675	3.16666667	2.1375
17	1.45						
18	1.25	0.5	0.68	0.35	0.5075	2.26666667	1.15033333
19	0.7						
						Q (CFS) =	**22.522133**

Pump Between 6 and 8 (Pivot) = 800 GPM reading

Phase 8 Top End
2 Segment Weir

	d1	d2	d3	d4	Length	Ave h	Q (CFS)
Cell 1	0.82	0.83	0.84	0.83	4.75	0.83	11.5426621
Cell 2	0.73	0.74	0.75	0.75	4.4	0.7425	9.05797471
						Q (CFS) =	**20.600637**

Cement Ditch Check
Lat 44 17.617N Long 121 26.810W
3 Segment Weir
Loss down side ditch with closed gate = 0.1' Across 2' Weir

	d1	d2	d3	d4	Length	Ave h	Q (CFS)
Cell 1	0.74	0.74	0.73	0.71	4.75	0.73	9.56233245
Cell 2	0.65	0.65	0.64	0.63	4.8	0.6425	8.01143447
Cell 3	0.23	0.24	0.25	0.26	4.6	0.245	1.83780824
						Q (CFS) =	**19.411575**

French Pump = 600 GPM
Gillespie Pump = 275 GPM

Phase 9 Top End
Leaking Check Structure- Did not Rate - Used Channel Section Below

Rated Canal Above Check Structure
Lat 44 18.066 Long 121 25.972W

Rod Set Sta	Depth	V-60%	V-20%	V-80%	Ave V (ft/s)	Segment Area	Q (CFS)
1	0						
2	0.2	0	0	0	0	0	0
3	0.45						
4	0.6	0.74	0.89	0.59	0.74	1.3	0.962
5	0.9						
6	1.1	0.98	1.23	0.81	1	2.2	2.2
7	1.3						
8	1.45	1.25	1.55	1.08	1.2825	2.8	3.591
9	1.45						
10	1.4	1.3	1.44	1.02	1.265	2.73333333	3.45766667
11	1.25						
12	1.1	1.32	1.53	1.05	1.305	2.13333333	2.784
13	0.85						
14	0.75	1.03	1.2	0.8	1.015	1.46666667	1.48866667
15	0.6						
16	0.4	0.68			0.68	0.66666667	0.45333333
17	0						
						Q (CFS) =	**14.936667**

McKenzie Reservoir Ramp Flume

Read 0.59 at Gauge
District/USBR Rating Curve Used **Q (CFS) =** **14.4**

Seepag Loss Summary				Seepage Loss Est.
Phase 4	Rating	28.16725		
	Gauge	27.6		
Phase 5	3-Weir	26.1751403	Seg 4-5	1.42
(Arnold)				
Brockew		0.55679287		
Wilse		0.22271715		
Phase 6	Rating	22.5221333	Seg 5-6	2.87
Side Gate Loss		0.04454343		
Pivot Pump		1.78173719		
Phase 8	2-Weir	20.6006368	Seg 6-8	0.10
Side Gate Loss		0.20850162		
Cement Ditch	3-Weir	19.4115752	Seg 8 to	0.98
French Pump		1.3363029		
Gillespie Pump		0.61247216		
Phase 9	Rating	14.9366667	Seg C to 9	2.53
McKenzie Res	Ramp	14.4	Seg 9 to Res	0.54
			Estimted Loss	8.44
		Error Adjustm	5%	0.42
			Final Loss Es	**8.02**

956

4/27/12

Phase 4 Top End (Watson Reservoir)

47.3
47.1
47.1

Watson Gauge Reading **Q(CFS) = 47.166667**

Cyrus Pond Flume Readin 0.61 Q(CFS)= 6.42

Phase 5 Top End Arnold Check

3 Segment Weir Rating

	d1	d2	d3	d4	Length	Ave h	Q (CFS)
Cell 1	1.03	1.04	1.04	1.04	4.27	1.0375	14.296172
Cell 2	0.96	0.92	0.89	0.83	4.33	0.9	11.799296
Cell 3	0.94	0.92	0.92	0.91	4.38	0.9225	12.3787708
						Q (CFS) =	**38.474239**

LSD

Brockew 250 GPM
Wilse 100 GPM

Phase 6 Top End

3 Segment Weir - Blow-Out Mid Section with Angled Center Section - No Acceptable

20 GPM Est. Loss to Closed Side Gate (located below rating shown below)

Rated Canal Above Check Structure
Lat 44 16.897N Long 121 28.167W

Rod Set Sta	Depth	V-60%	V-20%	V-80%	Ave V (ft/s)	Segment Area Q (CFS)	
1	1						
2	1.35	0.74	0.83	0.54	0.7125	2.53333333	1.805
3	1.45						
4	1.6	1.04	1.18	0.7	0.99	3.1	3.069
5	1.6			0			
6	1.7	1.26	1.36	1	1.22	3.43333333	4.18866667
7	1.85						
8	1.9	1.41	1.62	1.24	1.42	3.8	5.396
9	1.95						
10	1.9	1.48	1.62	1.21	1.4475	3.83333333	5.54875
11	1.9						
12	1.9	1.42	1.53	1.25	1.405	3.78666667	5.32026667
13	1.88						
14	1.8	1.24	1.51	1.1	1.2725	3.62	4.60645
15	1.75						
16	1.68	1.07	1.12	0.95	1.0525	3.28666667	3.45921667
17	1.5						
18	1.3	0.74	0.83	0.55	0.715	2.46666667	1.76366667
19	0.9						
						Q (CFS) =	**35.157017**

850

Pump Between 6 and 8 (Pivot) = 800 GPM reading Sister's View Farm
Pump Between 6 and 8 (Pivot) = 600 GPM reading Sister's View Farm

Phase 8 Top End
3 Segment Weir Rating

	d1	d2	d3	d4	Length	Ave h	Q (CFS)
Cell 1	0.83	0.84	0.85	0.88	4.75	0.85	11.9519316
Cell 2	0.82	0.83	0.84	0.84	4.4	0.8325	10.7082909
Cell3	0.76	0.73	0.71	0.67	4.65	0.7175	9.1204542
						Q (CFS) =	**31.780677**

Cement Ditch Check
Lat 44 17.617N Long 121 26.810W
3 Segment Weir
Loss down side ditch with closed gate = 0.1' Across 2' Weir

	d1	d2	d3	d4	Length	Ave h	Q (CFS)
Cell 1	0.81	0.79	0.78	0.76	4.75	0.785	10.6376369
Cell 2	0.77	0.78	0.77	0.77	4.8	0.7725	10.5032676
Cell 3	0.7	0.71	0.72	0.71	4.6	0.71	8.88120349
						Q (CFS) =	**30.022108**

59

Gillespie Pump = 275 GPM
Phase 9 Top End
Rated Canal Above Check Structure
Lat 44 18.066 Long 121 25.972W

Rod Set Sta	Depth	V-60%	V-20%	V-80%	Ave V (ft/s)	Segment Area	Q (CFS)
1	0.1						
2	0.3	0.19	0	0	0.19	0.68666667	0.13046667
3	0.63						
4	0.9	1.08	1.27	0.82	1.0625	1.75333333	1.86291667
5	1.1						
6	1.4	1.3	1.65	0.86	1.2775	2.76666667	3.53441667
7	1.65						
8	1.85	1.32	1.66	1.13	1.3575	3.6	4.887
9	1.9						
10	1.9	1.49	1.64	1.15	1.4425	3.76666667	5.43341667

11	1.85						
12	1.7	1.4	1.76	1.18	1.435	3.36666667	4.83116667
13	1.5						
14	1.4	1.48	1.83	1.15	1.485	2.66666667	3.96
15	1.1						
16	1.05	1.21	1.5	0.93	1.2125	1.93333333	2.34416667
17	0.75						
18	0.55	0.27			0.27	0.86666667	0.234
						Q (CFS) =	**27.21755**

McKenzie Reservoir Ramp Flume

Read 0.9 at gauge
District/USBR Rating Curve Used **Q (CFS) =** **28.1**

Rod Set Sta	Depth	V-60%	V-20%	V-80%	Ave V (ft/s)	Segment Area	Q (CFS)
1	1.75						
2	1.75	1.34	1.82	1.14	1.41	2.615	3.68715
3	1.73	1.67			1.67	1.73666667	2.90023333
4	1.73	1.89	2.1	1.67	1.8875	1.73	3.265375
5	1.73	1.85			1.85	1.72	3.182
6	1.7	1.85	2.1	1.5	1.825	1.71	3.12075
7	1.7	1.72			1.72	1.7	2.924
8	1.7	1.6	1.59	1.37	1.54	1.69	2.6026
9	1.67	1.33			1.33	1.68	2.2344
10	1.67	1.3	1.56	1.02	1.295	2.505	3.243975
						Q (CFS) =	**27.160483**

p 60

Seepag Loss Summary				Seepage Loss Est.
Phase 4				
	Gauge	47.1666667		
Cyrus Pond	Flume	6.42		
Phase 5	3-Weir	38.4742388	Seg 4-5	2.27
(Arnold)				
Brockew		0.55679287		
Wilse		0.22271715		
Phase 6	Rating	35.1570167	Seg 5-6	2.54
Side Gate Loss		0.04454343		
Pivot Pump		1.78173719		
Pivot Pump		1.3363029		
Phase 8	2-Weir	31.7806767	Seg 6-8	0.21
Side Gate Loss		0.20850162		
Cement Ditch	3-Weir	30.022108	Seg 8 to	1.55
Gillespie Pump		0.61247216		
Phase 9	Rating	27.21755	Seg C to 9	2.19
McKenzie Res	Ramp	27.1604833	Seg 9 to Res	0.06
			Estimted Loss	8.82
		Error Adjustm	5%	0.44
			Final Loss Es	**8.38**

10 of 10

DESCHUTES RIVER
CONSERVANCY

January 14th, 2015

Three Sisters Irrigation District
Attn: Marc Thalacker
P.O. Box # 2230
Sisters, OR 97759

RE: TSID MAIN CANAL PIPING PHASES 7-9

Dear Marc,

The DRC would like to offer its steadfast support of the efforts of Three Sisters Irrigation District to conserve water by piping its Main Canal. The DRC and TSID have partnered since 2004 to complete water conservation projects such as the upcoming phases 7, 8 and 9 of Main Canal piping. The purpose of this letter is to confirm the DRC's commitment to seek matching funds in the amount of $1,500,000 over a three year period in support of phases 7, 8 and 9 of TSID's Main Canal Piping project. The DRC is confident that it can secure the funds from a variety of sources including the Pelton Water Fund, Oregon Watershed Enhancement Board and the National Fish & Wildlife Foundation.

It is our understanding that phases 7, 8 and 9 of the TSID Main Canal Piping Project will conserve 3 cfs of water that will be permanently protected as instream flow in Whychus Creek. The DRC 's mission is to restore streamflows and improve water quality, and we are supportive of TSID's continuing efforts to aggressively pursue water conservation in support of the reintroduction of anadromous fish species in Whychus Creek.

Please contact me if you have any questions about this funding commitment.

Sincerely,

Tod Heisler
Executive Director, DRC

p62

January 20, 2015

Three Sisters Irrigation District
Attn: Marc Thalacker
P.O. Box 2230
Sisters, Oregon 97759

RE: TSID Main Canal Piping Phases 7-9

Dear Marc,

The Bonneville Environmental Foundation (BEF) would like to offer strong support for the Three Sisters Irrigation District's project to pipe its main canal and develop new on site and on-farm hydro-electric generation projects throughout the district. BEF and TSID have partnered since 2002 to explore, develop, and support projects that conserve water, restore flow, and generate electricity.

BEF is in discussions now with TSID regarding providing funding to help develop hydro-electric power generation and also to support feasibility analyses of projects that generate on-farm power through increased piping, conservation, generation and water delivery efficiency.

BEF is eager to support TSID's ongoing efforts to pursue water conservation, piping, power production, and stream flow restoration. In 2015-2016, BEF expects to provide technical support and funding to support TSID's work.

Sincerely,

Todd Reeve
CEO
Bonneville Environmental Foundation

p 63

THREE SISTERS IRRIGATION DISTRICT

P. O. BOX 2230
SISTERS, OR 97759

541-549-8815 (OFFICE)
541-549-8070 (FAX)

RESOLUTION 2015-01

BUREAU OF RECLAMATION WATERSMART GRANT

JANUARY 20, 2015

WHEREAS, The Board of Directors of the Three Sisters Irrigation District has reviewed and is in support of the Three Sisters Irrigation District 2015 Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Application

WHEREAS, Three Sisters Irrigation District is capable of providing the amount of funding with in-kind contributions, specified in the funding plan; and

WHEREAS, Three Sisters Irrigation District will work with the Bureau of Reclamation to meet all established deadlines for entering in to a cooperative agreement.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors agrees and authorizes this resolution to approve and support this grant application and project:

NOW THEREFORE, the Board of Directors authorizes, empowers and directs Marc Thalacker, District Manager to execute and deliver, in the name and on behalf of district, the Grant Agreement if so awarded by Bureau of Reclamation.

Dated January 20, 2015

Don Boyer, President

Pattie Apregan, Vice President

Thayne Dutson, Secretary/Treasurer

p64

TSID Watson-McKenzie Main Canal Pipeline Project Phases 6-9 And Net Meter/Micro Hydro Facility

BUDGET ITEM DESCRIPTION	COMPUTATION			TOTAL COST	BOR WATERSMART	BEF,ODOE,NFWF NFF and other	OWEB	PELTON FUND	TSID
	$/Unit	Unit	Quantity						
SALARIES AND WAGES									
Manager/Adminstration	$43.27	hr	300	$12,981					$ 12,981
Office Administration	$17.00	hr	450	$7,650					$ 7,650
Equipment Operator	$20.00	hr	2500	$50,000				$ 50,000	
Equipment Operator	$20.00	hr	2500	$50,000				$ 50,000	
Equipment Operator	$20.00	hr	2500	$50,000				$ 50,000	
Equipment Operator	$20.00	hr	2500	$50,000				$ 50,000	
Equipment Operator	$20.00	hr	2500	$50,000				$ 50,000	
FRINGE BENEFITS									
Manager/Adminstration	$13.21	hr	300	$3,963					$ 3,963
Office Administration	$3.93	hr	450	$1,769					$ 1,769
Equipment Operator	$3.16	hr	2500	$7,900				$ 7,900	
Equipment Operator	$3.16	hr	2500	$7,900				$ 7,900	
Equipment Operator	$3.16	hr	2500	$7,900				$ 7,900	
Equipment Operator	$3.16	hr	2500	$7,900				$ 7,900	
Equipment Operator	$3.16	hr	2500	$7,900				$ 7,900	
			Sub-total	$315,663				$ 289,500	$ 26,363
Backfill/Fuel/Supplies/Legal/Insurance									
Backfill Material	$ 8	Cu Ft	100,000	$800,000					$ 800,000
Fuel	$2.75	gallon	65,000	$178,750					$ 178,750
Supplies				$50,000				$ 50,000	
Insurance/Legal				$30,000				$ 30,000	
TSID OWNED EQUIPMENT									
Excavator 450	$ 100	Per Hour	1800	$180,000					$ 180,000
Excavator 312	$ 60	Per Hour	1000	$60,000					$ 60,000
D-8 Cat	$ 125	Per Hour	1000	$125,000					$ 125,000
Front End Loader JD 844J	$ 90	Per Hour	1800	$162,000					$ 162,000
On Road Dump Truck	$ 35	Per Hour	1800	$63,000					$ 63,000
On Road Dump Truck	$ 35	Per Hour	1800	$63,000					$ 63,000
On Road Dump Truck	$ 35	Per Hour	1800	$63,000					$ 63,000
Off Road Dump Truck Cat 735	$ 85	Per Hour	1500	$127,500					$ 127,500
Backhoe	$ 22	Per Hour	700	$15,400					$ 15,400
RENTAL EQUIPMENT									
Water Truck	$ 3,000	Per month	6	$18,000		$ 18,000			
HDPE Welding Machine	$ 17,000	Per Month	3	$51,000.00					$ 51,000
			Sub-total	$1,986,650		$ 18,000	$ -	$ 80,000	$ 1,886,650

p65

TSID Watson-McKenzie Main Canal Pipeline Project Phases 6-9 And Net Meter/Micro Hydro Facility

SUPPLIES/MATERIALS									
42" SDR 32.5 HDPE pipe 63 psi	$ 77	feet	14000	$1,071,527	$ 1,000,000	$ 51,025		$ 20,502	
36" SDR 15.5 HDPE pipe 139 psi	$ 114	feet	3260	$371,135			$ 371,135		
32" SDR 15.5 HDPE pipe 139 psi	$ 90	feet	1650	$148,427			$ 148,427		
28" SDR 15.5 HDPE pipe 139 psi	$ 69	feet	1685	$115,997			$ 115,997		
26" SDR 15.5 HDPE pipe 139 psi	$ 59	feet	2650	$157,300		$ 42,859	$ 114,441		
22" SDR 15.5 HDPE pipe 139 psi	$ 42	feet	1540	$64,214		$ 64,214			
12" SDR 13.5 HDPE pipe 160 psi	$ 15	feet	3400	$52,292				$ 52,292	
			28185						
Combination Air/Vac Valves APCO or Waterman	$ 1,000	each	27	$27,000		$27,000			
Pressure Relief Valves Cla-Val	$ 2,500	each	5	$12,500		$12,500			
Pressure Relief Valves Waterman	$ 500	each	6	$3,000		$3,000			
Riser & Saddle Assemblies	$ 500	each	40	$20,000		$20,000			
Clamshells for turn outs & Cla-Val	$ 2,000	each	14	$28,000		$28,000			
16" Butterfly Valves for Turnouts	$ 2,000	each	14	$28,000		$28,000			
16" Meters for Turnouts	$ 2,000	each	2	$4,000		$4,000			
			Sub-total	$2,703,393	$ 1,000,000	$ 280,599	$ 750,000	$ 72,794	$ -
Net Meter/Micro Hydro Facility						Bonneville Envir.			
Engineering & Other						Foundation			
Electrical Engineering				$15,000		$15,000			
Hydro Plant Engineering				$27,000		$27,000			
Materials									
Powerhouse Concrete Building				$25,000		$25,000			
Turbine and Generator package (one Francais Turbine)				$80,000		$80,000			
Turbine inlet, Bypass valves, interconnection valves				$35,000		$35,000			
Interconnection (transformer, line,)				$15,000		$15,000			
Controls				$50,000		$50,000			
Security and Operational Technology installation				$5,000		$5,000			
Labor									
Powerhouse construction (TSID staff)				$25,000		$25,000			
Electrical Installation (controls and generator)				$15,000		$15,000			
Turbine Generator Installation				$5,000		$5,000			
Other									
Legal & Permits				$5,000		$5,000			
Contingency				$10,000		$10,000			
Insurance				$5,000		$5,000			
			Sub-total	$317,000	$ -	$ 317,000	$ -	$ -	$ -
Environmental				$15,000				$ 15,000	
TOTAL				$3,035,393	$1,000,000	$597,599	$750,000	$ 87,794	$1,915,013

BOR	$ 1,000,000		
BEF & Other	$ 615,599	**Federal**	$ 1,000,000
OWEB	$ 750,000	**Non Federal**	$ 3,737,906
PELTON	$ 457,294		
TSID	$ 1,915,013		

P66

TSID AWEP SCHEDULE

Year 2015

SCHAAD	PRIOR	1895	JR ACRES	Total		2014	2015	2016
Keeton B1		145		145				
Keeton B2								
Keeton B3								
Schaad		148.5		148.5				
Wiltse		41.5		41.5				
Herold		28		28				
Brockway		42		42				
FRONK		240.5		240.5				
Sub Total								
Total				645.5				

TSID RCPP/AWEP SCHEDULE

Year 2016

SCHAAD	PRIOR	1895	JR ACRES	Total		2014	2015	2016
Hurtley South		102		33.5				
Hurtley Middle				36.5				
Hurtley North				102				
Cyrus HP	80	10	17.5	107.5				
Christensen		40		40				
Faris	36	20		56				
Bieber		4		4				
Salmon		40		40				
Pine Ridge Ranch LLC		328.4	36.8	365.2				
Richardson		17		17				
Drake			33	33				
Gillespie		7.5		7.5				
Pollard		10.5		10.5				
Kline		3	11	14				
Gillespie		90		90				
Jeffers		6		6				
Total				962.7				
BARTLEMAY								
Mansker		11.1		11.1				
Miller		17.4		17.4				
Cornick		7.1		7.1				
Stengal		10.7		10.7				
Evered		15.3		15.3				
				61.6				
Grand Total				1024.3				

p 68

TSID RCPP/AWEP SCHEDULE

Year 2017

	PRIOR	1895	JR ACRES	Total		2014	2015	2016
French	25	110		135				
M Cyrus	54.8	79.5		134.3				
CEMENT DITCH								
Enger		32		32				
Weston		3		3				
Swaner		40		40				
Boyer		40		40				
A Keeton	30	85.5		115.5				
Z DITCH								
McKeever		16		16				
Poole		20		20				
Barclay		17		17				
King		16		16				
Tewalt		16		16				
BROWN DITCH								
Redfield		147		147				
Total				731.8				

TSID RCPP/AWEP SCHEDULE

Year 2018

DESERT SANDS	PRIOR	1895	JR ACRES	Total	2013	2014	2015	2016
Hermans Ditch								
Eady		117.00		117.00				
Swaner		65		65				
BROWN								
Goodwin		13		13				
Rinke		9		9				
Rodgers		7.5		7.5				
Hicks		20		20				
MAIN CANAL								
Keeton		173.00		173				
Gillespie		56		56				
DESERT SANDS								
Frankel		15.00		15				
Moen		8.00		8				
Moen		8.00		8				
Lamphere		8.00		8				
Baldwin		5.00		5				
Angel		30.00		30				
Biggers		5.00		5				
Crenshaw		5.00		5				
Stephenson		7.00		7				
Booras		8.00		8				
F & L		11.00		11				
McMonagle		3.00		3				
Peterson		4.77		4.77				
Vendetti		6.23		6.23				
Parker		4.00		4				
Molesworth		9.00		9				
Total				597.50				

p 70

TSID Net Meter/ Micro Hydro kWh Production Estimates

Flow (cfs)	Net Head Turbine (ft)	Water-Wire Efficiency-Cornell Turbine/Generator %	Power (kW)	Energy-30day (kW-Hrs)	Energy-60day (kW-Hrs)	Energy-90day (kW-Hrs)	Energy-120day (kW-Hrs)	Energy-150day (kW-Hrs)	Energy-180day (kW-Hrs)	Energy-210day (kW-Hrs)
2.4	163	75	25	17,887	35,774	53,662	71,549	89,436	107,323	125,210
4.8	163	75	50	35,774	71,549	107,323	143,098	178,872	214,647	250,421
4.8	163	75	50	35,774	71,549	107,323	143,098	178,872	214,647	250,421
7.7	163	75	75	54,000	108,000	162,000	216,000	270,000	324,000	378,000
19.7				143,436	286,872	430,308	573,744	717,180	860,616	1,004,052

25 kW 210 days	125,210	$7,049.35
50 kW 150 days	178,872	$6,439.40
50 kW 150 days	107,323	$3,863.64
75 kW 90 days	162,000	$5,832.00
Total kWh	573,406	$16,135.04

Cornell

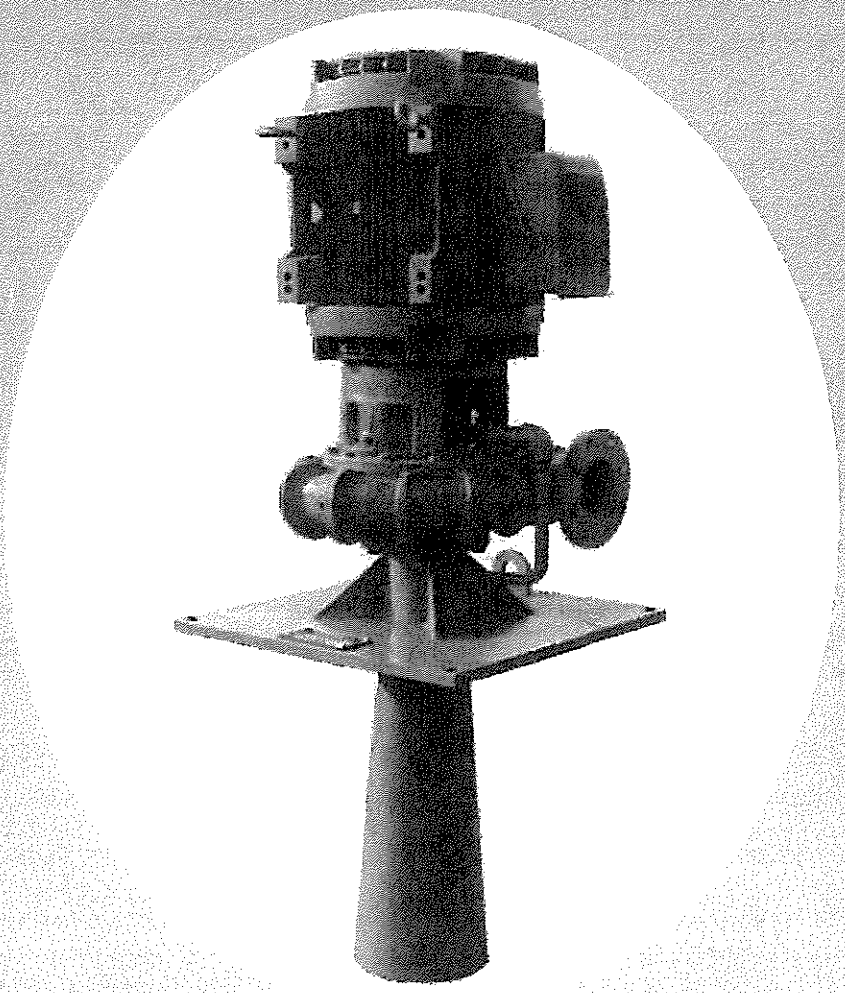
INTRODUCTION

This guide is offered as a tool to evaluate potential turbine sites and to select proper turbines.

Features of sites and installations are described and their effects on performances are discussed.

The equations were developed with the objective to give quick and adequate solutions. No discussions or proofs are included.

The calculations are in the FT/L8S/SEC dimensional system.



p 72

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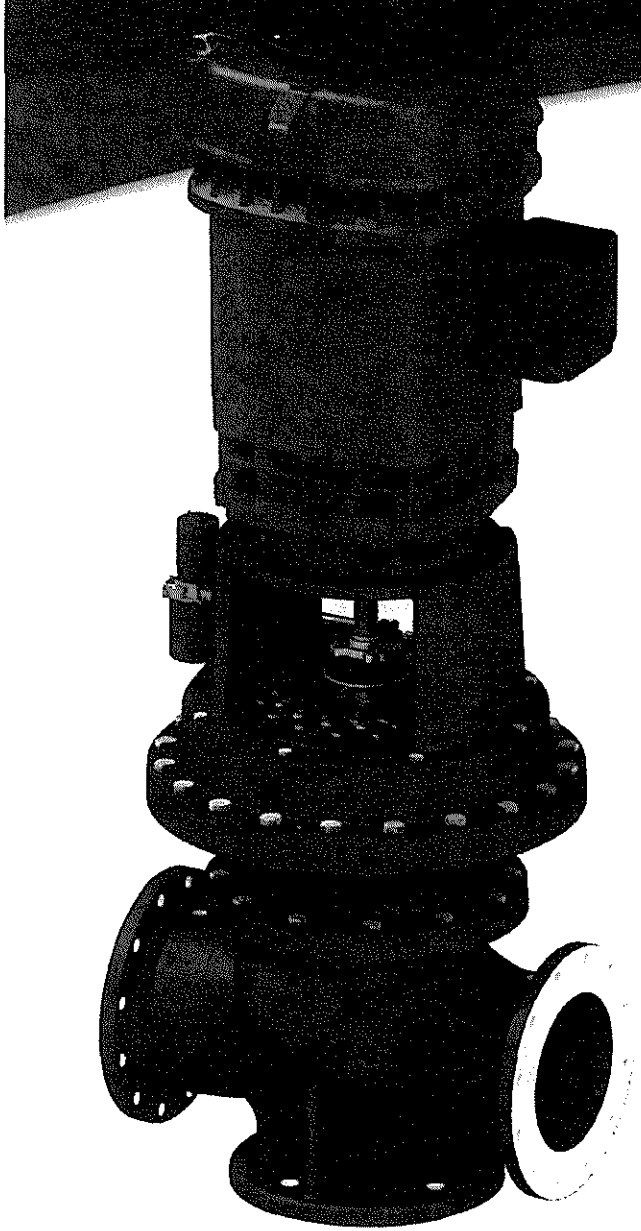
SOAR TECHNOLOGIES, INC.



In-Line Hydro Turbine

SOAR Technologies **In-Line Turbine (ILT)** is a product line of small highly efficient hydro power generation units. Designed in house for use within new or existing water systems, these turbines are site specific for maximum efficiency but share a number of common parts for competitive pricing and quick lead time. Multiple housing sizes are available from 4" to 24" with standard flanges for ease of installation, covering flows from 100-30,000 GPM and heads from 25-400 Feet. ILT's come standard with fixed vanes, but also are available with SOAR Technology's proven variable flow wicket gate technology to improve efficiency over a wider flow range.

Easy Integration

In-Line design simplifies installation along with standard flange sizes for quick bolt-in operation.

Wicket Gates

Adjustable wicket gates maintain optimum efficiency over a widened flow range to maximize power recovery but can be excluded for cost savings.

Maintenance Reduction

Simple design reduces down time by prolonging turbine life and extending maintenance cycles.

Site Specific Customization

Standardized parts adapted to each site provide reduced costs and higher efficiencies.

p 73

Conduit Applications

ILT units are designed to recover lost energy in either new or existing water systems with minimal impact on the environment.

Complete System Packages

Packaged systems are available with all necessary components from drop-in generation to power grid connectivity.

Application Support

SOAR provides customer support from project conception to completion. Analysis, design, construction, and ongoing support are all available services from our qualified team of experts.

Canyon

Micro Hydroelectric Systems to 100kW

- Turbine Systems
- System Options
- Design Services
- Hydropower FAQ
- Project Gallery

First-Time Hydropower Project?

Learn basic design principles in the *Guide to Hydropower*

Micro-Hydro Systems

Smaller Hydropower Systems less than 100kW

For larger Utility/IPP systems, please click here.

Canyon Hydro designs and manufactures small hydro systems ranging from 4kW to 25MW. Each system is designed and built at our manufacturing facilites in the USA.

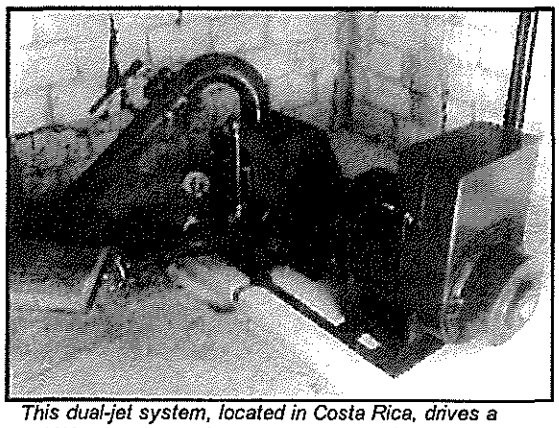
For our customers with residential or small community projects, Canyon Hydro provides a broad selection of micro-hydro systems up to about 100kW, each delivering high efficiency, quality and reliability at a reasonable cost. If you have requirements for larger systems, please refer to Canyon Hydro Utility/IPP Systems.

You can purchase a complete hydro system from Canyon Hydro, or individual components. We will be happy to work with you to determine the best approach. A typical hydro system from Canyon includes the following components:

- Water turbine and housing
- Drive system
- Generator
- Electronic Governor
- Assembly Frame

In addition, many of our systems are equipped with one or more of the following options:

- Stainless steel runner
- Variable needle nozzle
- Frequency protection jet deflector



This dual-jet system, located in Costa Rica, drives a 14kW generator, and uses a needle nozzle to allow adjustment for changing flow conditions without shutting the system down.

Canyon Standard Turbines

The heart of a Canyon Hydro system is the water turbine. Efficiency counts most here, and we take great care to ensure maximum power transfer. Canyon Pelton runners are all-metal, cast as a single unit. Bucket tip, splitter and exit angles maximize the transfer of hydraulic energy to the turbine shaft. Each bucket is hand-polished, with special attention directed to the rear of the bucket to minimize internal aerodynamic drag.

Similar procedures are employed for Canyon Crossflow and Francis turbines, using the highest quality materials and advanced manufacturing techniques.

Most importantly, Canyon turbines are backed by a group of experienced professionals who know hydro systems, and are dedicated to the success of your project.

Canyon Will Design Your Turbine System

We strongly recommend that you let Canyon Hydro design the proper turbine system for your site, because the most efficient system involves many complex factors. **There is no charge for this service.**

Beginning with your measurements of HEAD and FLOW, Canyon experts will specify the right combination of turbine type, diameter, bucket or blade characteristics, nozzle sizing, shaft speed, housing dimensions, and more. We think it's important that you get the most power possible for your investment.

The most essential information we require is *accurate* HEAD and FLOW measurements. Eventually, we'll also need information about your pipeline and electrical requirements, but we

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Preliminary Technical Data of Francis Units

Watson Reservoir Net Metering Hydro project

Items	26 kW	55 kW	80 kW
Turbine			
Model	HL110-WG-20	HL110-WG-25	HL110-WG-30
Main Shaft Layout	Horizontal	Horizontal	Horizontal
Design Flow Rate	2.5 cfs	4.8 cfs	7.7 cfs
Head Range	68-78 psi	68-78 psi	68-79 psi
Design Head	70 psi	70 psi	70 psi
Runner Diameter	7 7/8 inch (200mm)	9 27/32 inch (250mm)	11 13/16inch (300mm)
Inlet Diameter	12 inch (250mm)	12 25/32inch (350mm)	15 3/4 inch (400mm)
Turbine Speed	1800 r/min	1800 r/min	1800 r/min
Point Efficiency	80%	80%	80%
Turbine Output	30 kW	55 kW	85 kW
Generator			
Generator Type	Sync-Brushless	Sync-Brushless	Sync-Brushless
Rated Capacity	26 kW	55 kW	80 kW
Generator Speed	1800 r/min	1800 r/min	1800 r/min
Rated Voltage	220 V	220 V	220 V
Power Factor	0.8	0.8	0.8
Rated Efficiency	89%	90%	90%
Others			
Speed governor	Available	Available	Available
Control System	Available	Available	Available
Valve	Available	Available	Available

Note:

Pre-assembling and testing in China (see sample photos attached)
Selecting larger generator to cover higher water head
Conducting full QA/QC in the factory

p 75